SIGNAL

April 1959

Chief Signal Officer, USA
Lt. Gen. James D. O'Connell

37 Years of Distinguished Service

See Page 5

PHILCO Transistors operate

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SERVICE HOURS*

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with only 8 Failures!‡

Total Transistor Service Hours To Date	Total Transistors	Total Failures‡	Report
1,068,111	99	0	ELECTRONICS, Oct. 1, 1957, pg. 167
5,460,000	600	1	ELECTRONICS, Oct. 1, 1957, pg. 167
1,250,000	125	0	PHILCO REPORT, Feb. 10, 1959
16,000,000	10,192	2	WJCC REPORT, Feb. 1957
8,640,000	8,000	2	PHILCO REPORT, Feb. 12, 1959
19,196,232	18,601	3	PHILCO REPORT, Nov. 19, 1958

‡Failures due to all causes including human error.

Carefully documented reports now reveal that Philco electro-chemical transistors have amassed more than fifty-million hours of operation in six computers under actual field conditions. Here is proof of the outstanding performance and reliability that electronics engineers and designers have come to expect from Transistor Center, U.S.A. Of course, these transistors are still operating in their original high speed computer switching circuits . . . extending service life data on these transistors beyond the limits of any previously published information.

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*Documented service hours in these six computers only. Total transistors hours in similar circuits are many times this amount.

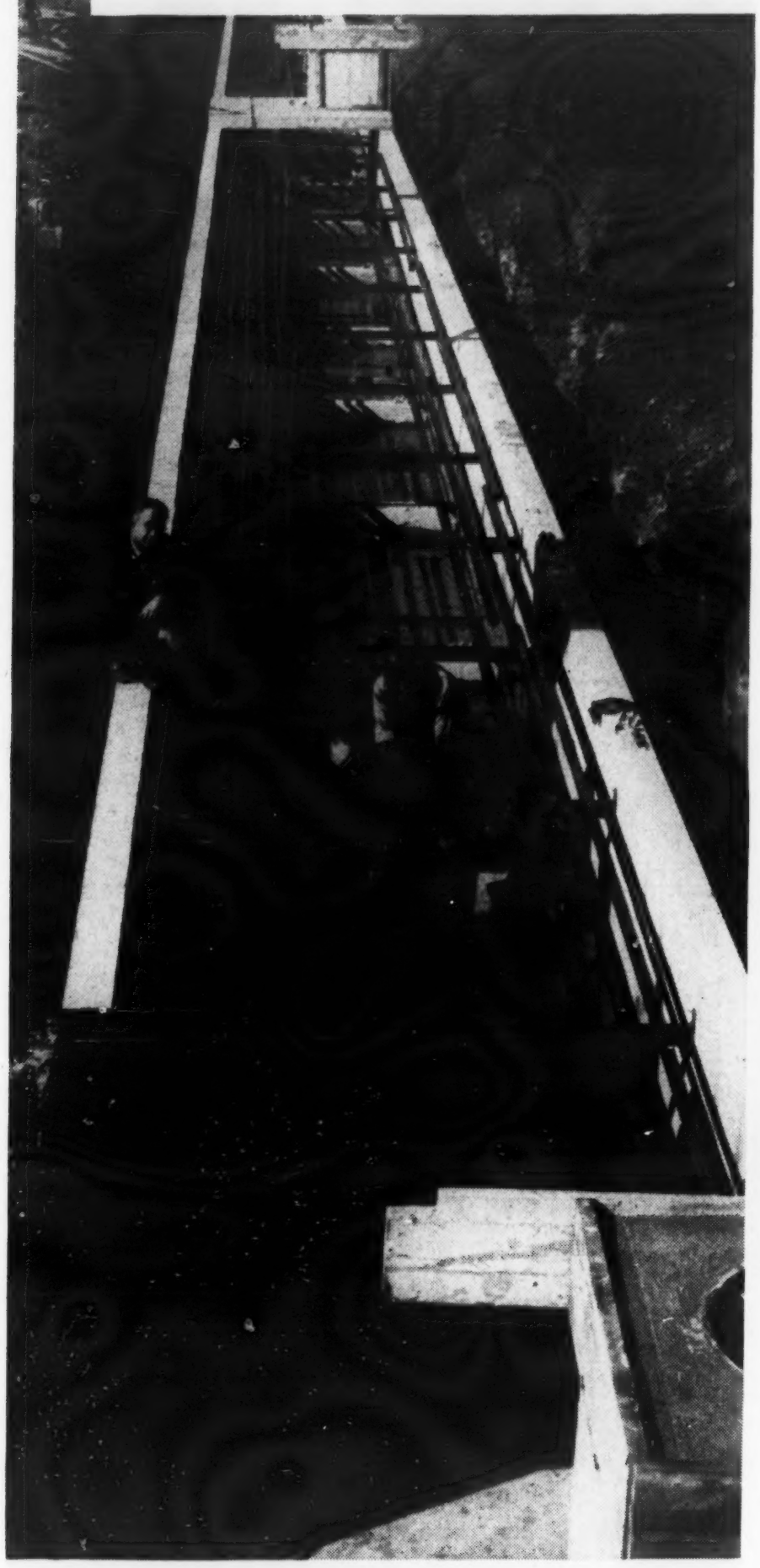
PHILCO CORPORATION

LANSDALE TUBE COMPANY DIVISION

LANSDALE, PENNSYLVANIA

TRANSISTOR CENTER U.S.A.

THEY PROBE THE FUTURE OF DEEP-SEA TELEPHONY

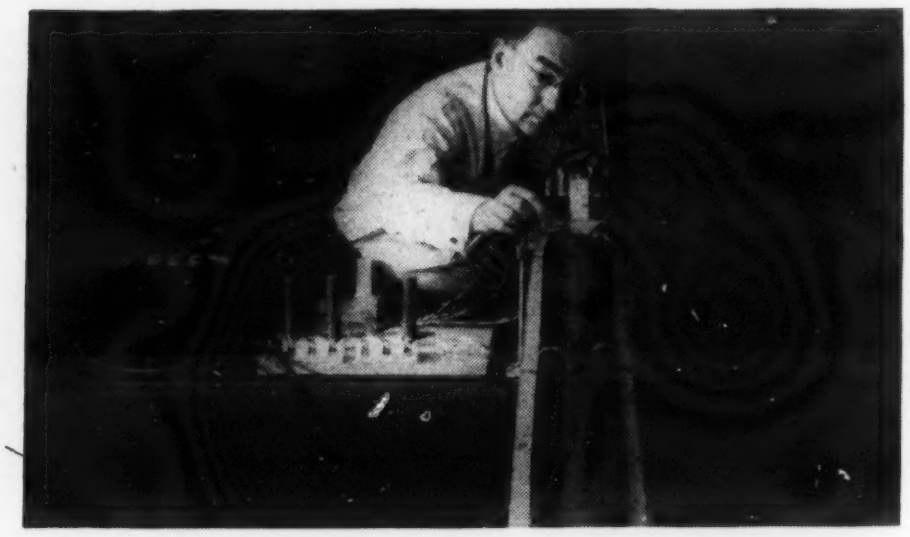


"Dry Land Ocean," under construction at Bell Laboratories, simulates ocean floor conditions, is used to test changes in cable loss. Sample cables are housed in pipes which contain salt water under deep-sea pressure. The completed trough is roofed in and is filled with water which maintains the pipes at 37° F., the temperature of the ocean floor.

Deep in the ocean, a submarine telephone cable system is extremely hard to get at for adjustment or repair. This makes it vitally important to find out what can happen to such a system *before* it is installed.

Bell Telephone Laboratories engineers do this by means of tests which simulate ocean floor conditions on dry land. Among many factors they test for are the effects of immense pressures on amplifier housings and their water-resistant seals. They also test for agents which work very slowly, yet can cause serious destruction over the years—chemical action, marine borers and several species of bacteria which strangely thrive under great pressures.

Through this and other work, Bell Telephone Laboratories engineers are learning how to create better deep-sea telephone systems to connect America to the rest of the world.



Highly precise instruments developed by Bell Laboratories engineers are used to detect infinitesimal changes in cable loss—to an accuracy of ten millionths of a decibel.

Seawater and sediment in bottle characterize ocean floor. Test sample of insulation on coiled wire is checked for bacterial attack by conductance and capacitance tests.

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BPA

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Journal of the Armed Forces Communications and Electronics Association

VOLUME XIII APRIL 1959 NUMBER 8

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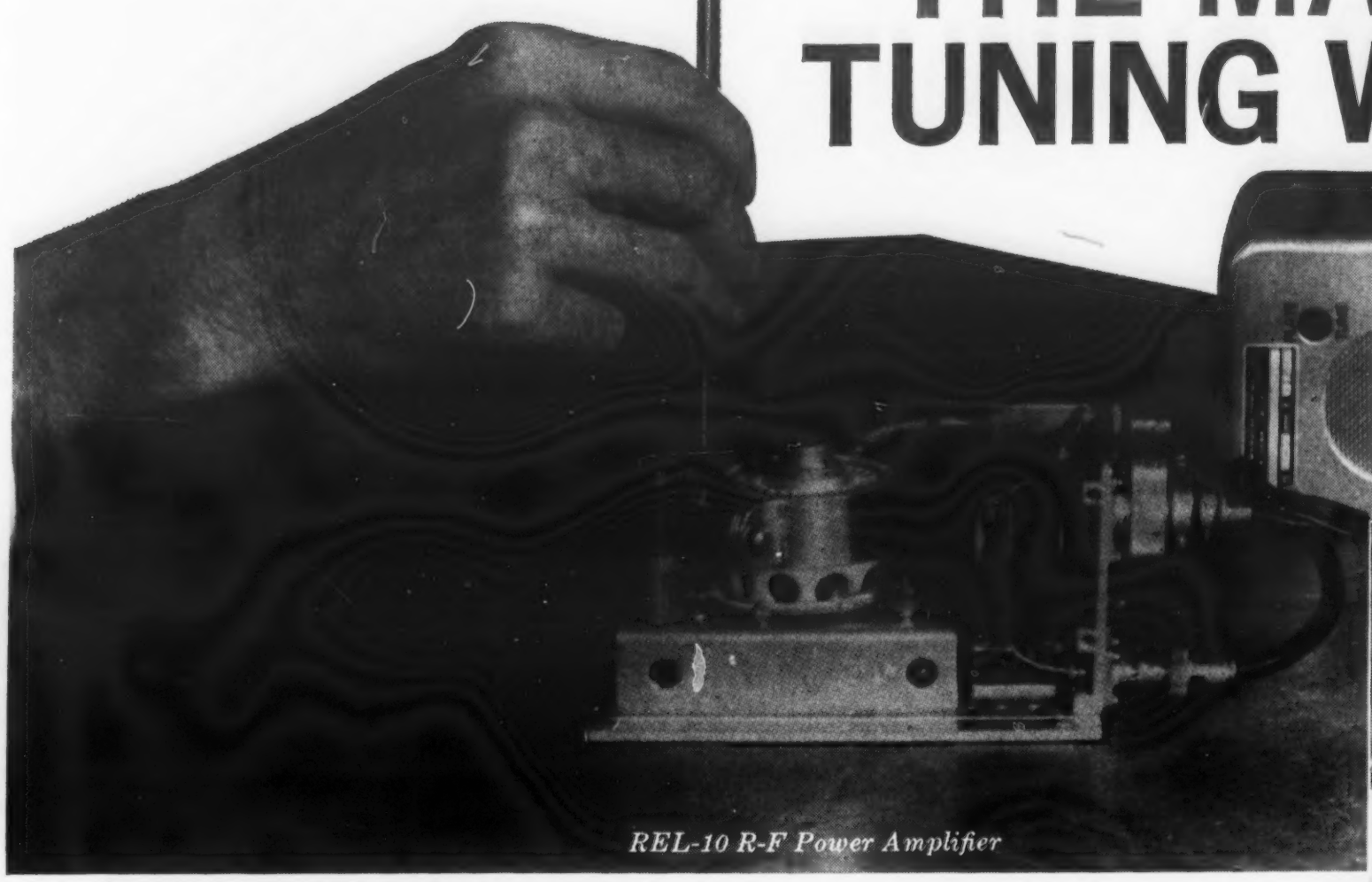
THE MAGIC TUNING WAND



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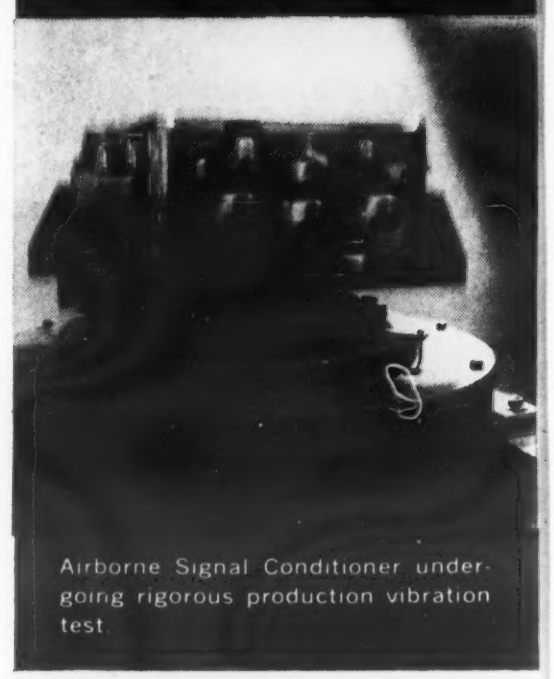
F-151 Trainer System produced for use by Air Force, NASA, and NATO.

Signal Conditioner Ground Checkout System produced for Titan and other missile programs.



Airborne Signal Conditioner undergoing rigorous production vibration test.

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Lt. Gen. James D. O'Connell
Chief Signal Officer, USA
First Vice President, AFCEA

A Tribute

General James D. O'Connell was born in the State of Illinois, attended public school in Chicago and before entering the United States Military Academy, enrolled in the University of Chicago. Graduating from West Point in 1922, he received his BS degree in Engineering and was commissioned a lieutenant of Infantry. General O'Connell was detailed in the Signal Corps in 1928 and in 1929 attended the Sheffield Scientific School of Yale University, receiving his MS degree in Communications Engineering in 1930.

Never idle and always willing to contribute his time and knowledge for the benefits of his fellow men, General O'Connell has literally been the symbol of military leadership in the communications and electronics fields. For his outstanding accomplishments, he has received the unique distinction of becoming the first Chief Signal Officer of the U.S. Army to wear the three stars of Lieutenant General.

So illustrious have been the career accomplishments of this distinguished military leader and respected friend that the entire membership of the Armed Forces Communications and Electronics Association joins in expressing the following tribute:

★ ★ ★

"As you retire on April 30, 1959, after more than thirty-seven years of military service, it is fitting that we, your friends and associates express our appreciation of your personal qualities and accomplishments. The official military records show that you have served your country with distinction in peace and in war in the United States, Europe and the Far East.

"The unofficial record in the hearts of your friends and fellow soldiers shows that you have richly earned the confidence of your superiors, the esteem of your peers and the affection of your subordinates.

"Your sound judgment, common sense, moral courage and deep concern for the dignity and worth of the individual have not only enabled you to serve your country well, but have enhanced these qualities in those who had the privilege of serving with and associating with you.

"Your contributions in the communications, electronic and photographic fields, culminating in your assignment as Chief of the Signal Corps, United States Army, coupled with your affiliation with our nation's electronic industries have been outstanding.

"The debt which the Armed Forces Communications and Electronics Association owes you for your wise counsel, firm leadership and unswerving devotion to the successful accomplishment of its mission is profoundly great.

"We wish you well in your retirement, we look forward to a continuing relationship with you and sincerely hope that the years ahead will bring Mrs. O'Connell and you good health and abundant happiness."

For AFCEA—W. J. Baird, Editor.

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Arnold C-type Alnico Magnets are available in a wide selection of gap densities ranging from 1,000 to over 7,500 gausses. There are six different basic configurations with a wide range of stock sizes in each group.

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Message From The Executive Vice President

(Also the 1959 AFCEA Convention Chairman)

"BILL" B. GOULETT

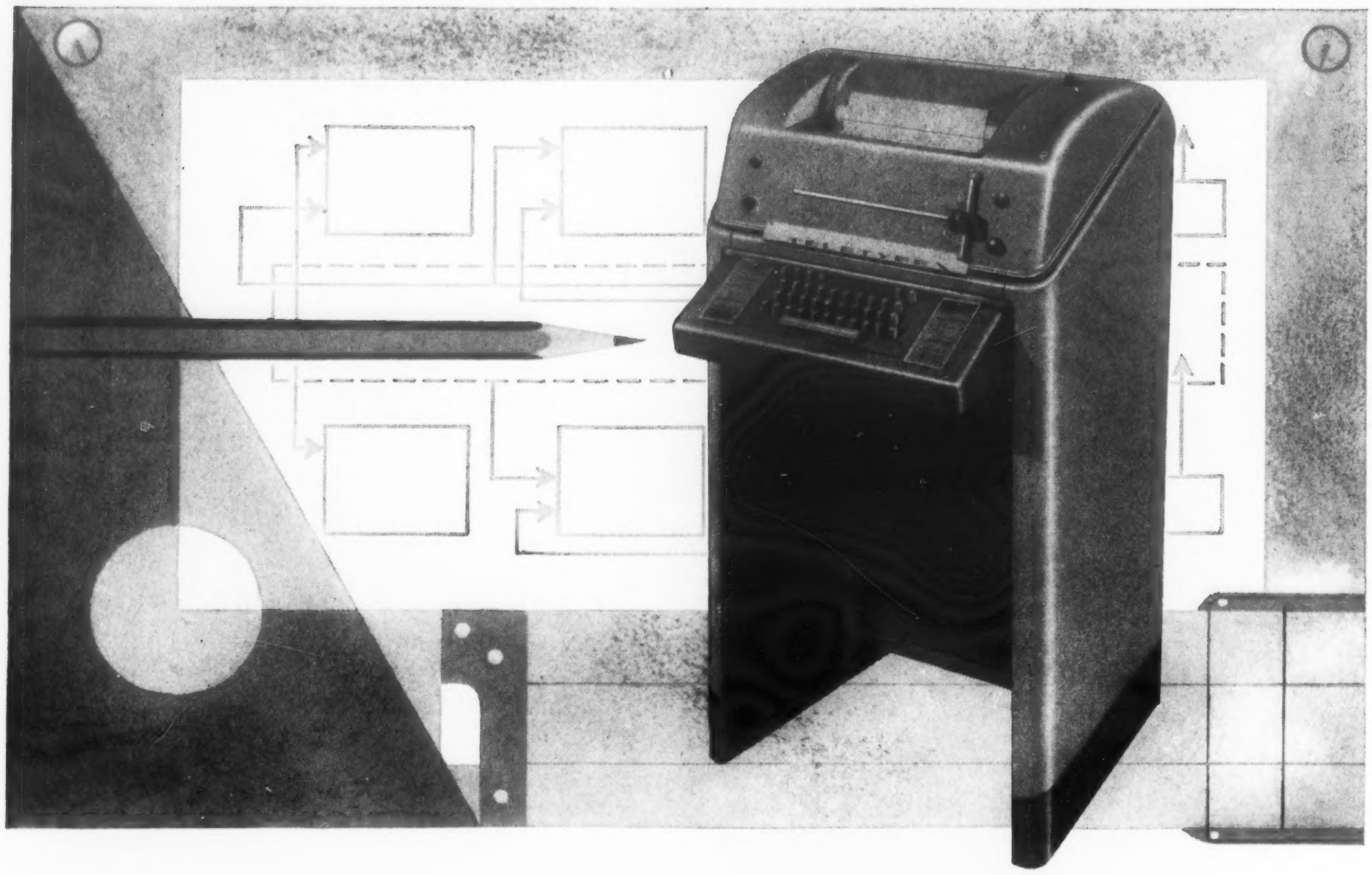
The sweeping searchlight of attention stops now and then on things that affect us AFCEANS. *More information on the 1959 AFCEA Convention and Exhibit at the Sheraton-Park Hotel, Washington, D. C., on June 3, 4 and 5.* We predict this will be AFCEA's best over-all Convention. Great satisfaction comes from the knowledge that the Honorable Leo A. Hoegh, Director of Civil and Defense Mobilization and former Governor of Iowa, has graciously consented to be the principal speaker at our Annual Banquet on June 4. Mr. Hoegh is a gifted speaker as well as a very prominent man with "Cabinet status." . . . Dated March 9, our First Convention Notice has been mailed to AFCEA members and other chosen persons; our Second Convention Notice (the final one) is planned for mailing on or just before May 1st. Please use the "package-deal" envelopes of the Second Notice for sending in your moneys. We are trying to pare down the prices; estimate they will be about the same as last year's, with "package-deal" prices for the Banquet, Buffet, and the two luncheons *about* thirty dollars, not including the pre-Banquet and the pre-Buffet receptions. . . . *Please send directly to the Reservations Manager, Sheraton-Park Hotel, for room reservations.* . . . Our Ham Station (Call: K4NAA/3) will probably have a rotatable beam antenna on the hotel roof, with transmission line to the lobby, the Navy says. Tentatively, K4NAA/3 is scheduled to be open from 10 A.M. to 10 P.M. the three days of the Convention. *Hams, bring your amateur licenses!* . . . Uniform? Optional, to fit circumstances. Hosts, of course, may specify uniforms for their own parties. . . . Remember the buffet and entertainment of last year? Well, John Gilbarte will strive to outdo himself this year; so bring the little woman and droves of your friends to this unusual and always festive affair. . . . Refresh yourself as to program details by reviewing page 42 of February's SIGNAL. . . . MEN, TAKE HOME CONVENTION NOTICES AND OTHER CONVENTION LITERATURE, AND BRING THE LADIES TO THE CONVENTION, AS AN INTERESTING AND WORTHWHILE PROGRAM IS BEING PREPARED FOR THEM.

EVP Travels: I look forward to visits to AFCEA Chapters and make them whenever I can. I have visited thirty-five. Arrangements are sometimes complicated, but the effort is surely worth it, as these visits afford opportunities of meeting wonderful chapter members and of swapping ideas and experiences. Unless out of town, I always attend the popular meetings of the Washington Chapter the first Thursday of each month (the usual time). Since January 1st, I have visited the South Carolina, Decatur, and Kansas City Chapters, and talked at length with President R. Robards of Scott-St. Louis. . . . On Feb. 17th, I was privileged to view the dedication ceremonies of the General Dynamics Corporation's Stromberg-Carlson Division, Sonar Test Tank, in Rochester, N. Y., where Rear Admiral J. S. Thach, USN, Commander Hunter Killer Force of the Atlantic Fleet, gave the principal address at the keynote luncheon, which was attended by about 200 prominent men. Details of this event appear on page 34.

Again, membership increases. Rising prosperity will bring up our membership, but we should all remember that our goals of 600 group members and 40,000 individual members require continuous scrambling. As an AFCEA member, can you enroll some others — to strengthen our Association and further its high aims?

Most cordially yours,

W. B. (BILL) GOULETT,
EXECUTIVE VICE PRESIDENT AND
1959 AFCEA CONVENTION CHAIRMAN



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Dependability—the inherent ability to stand up under the grueling punishment of continuous operation—is a Teletype tradition, tested over the years in a wide variety of demanding applications. The new Model 28 Line was designed in this tradition of dependability and ruggedness, with feature after feature provided to insure long periods of attention-free operation.

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Modular design. The Model 28 page printer and the other units in the 28 Line were designed for maximum interchangeability of components, mechanisms, and parts, simplifying "spares" requirements and greatly facilitating the training of personnel.

If you'd like detailed information about the Model 28 printer—or other apparatus in the Model 28 Line such as the ASR automatic send-receive set, or the tape punches and readers—write to Teletype Corporation, Dept. 73-D, 4100 Fullerton Avenue, Chicago 39, Illinois.

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LET'S TALK ABOUT COMMUNICATIONS

by
B. S. GILMER

President, Southern Bell Telephone and Telegraph Company

IN WORLD WAR I the communications industry was called upon by the military to develop field telephone systems and to develop radio for ground-to-air and ship-to-shore communications.

I might mention that in 1915, just two years before this country entered the War, the first transcontinental telephone line, made possible by the vacuum-tube amplifier, was placed in service. The vacuum tube, which also made radio possible, had been invented by deForest but a few years before.

Prior to World War I, Bell Telephone Laboratories technicians succeeded in an experiment in sending voice radio signals from this country to the Eiffel Tower in Paris. By the end of the War ground-to-air and ship-to-shore radio telephony was possible but still experimental. Commercial transatlantic radio-telephone service was not established until 1927.

Land lines telephone and telegraph communications of the American Army in France in World War I were highly successful to the surprise and delight of our allies. These had been developed by the Signal Corps using experienced groups of telephone and telegraph people and equipment and techniques with which they were thoroughly familiar.

Besides field communications systems and radio, the communications industry made significant contributions in other military work, especially in the development of detection devices for use against submarines, aircraft and artillery.

Photography, an important signal function, was not a military factor in the Civil War, although it was used then for historical purposes in preserving scenes of military life. But in World War I it developed into a useful tool of warfare through aerial and ground reconnaisance.

During World War I the art of warfare and the scientific laboratory developed much more than a casual acquaintance with each other, but the war was over before much had been born of the union. And when the War *was* over the Laboratory went back to its former peaceful ways, and the military for a time went into virtual retirement.

Several years prior to our entry into World War II our country began to prepare for eventualities. The military wasted no time in calling upon the nation's communications industry which by this time included radio as well as the telephone and telegraph.

The industry's scientific resources were called upon to perfect and develop not only new and improved communications equipment but all sorts of detection, control and detonating devices and systems and other equipment of military value. They were eminently qualified because of the tremendous progress they had made in electronics research and development in their continuing pursuit of better and more economical ways of providing communications services.

By the time our nation entered the War, nearly all of the industry's expansion and development work was being devoted to the defense effort. During the War, for instance, Bell Telephone Laboratories and the Western Electric Company, a segment of the industry I know most about, devoted about 85% of their facilities to war work. Other companies, I am sure, were as fully engaged in this effort.

Telephone scientists had developed an absolute altimeter for aircraft and had investigated ultra-high frequency radio, so it was natural that they should have taken a prominent part in the development of radar.

By the end of the War, Western Electric had delivered more than 56,000 Bell Laboratories-designed radars, roughly half of all the radars made in the United States.

The communications industry working with the military also developed sonar, the underwater counterpart of radar which uses high frequency sound waves to detect through water, ships and submarines.

Using the properties of the potentiometer, a fairly simple device which had been used for years to measure differences in electrical voltages, and radar, communications scientists developed the electronic gun director which accounted for the shooting down of many German and Japanese planes and many German buzz bombs.

The industry made hundreds of other contributions to weapons development and devised substitutes for many critical materials. Invention of a method of making high quality synthetic crystals was a major triumph in a war that was relying heavily on communications techniques.

Plain everyday communications for the military, while less spectacular than the foregoing, occupied a great deal of the industry's developmental, productive and operational effort. Efficient light-weight wire communications systems were developed for combat troops. The fast-moving destructive character of air warfare created an urgent need for vast, fast and efficient combat communications networks. They were required for the collection and analysis of information of enemy air movements and for the instantaneous assignment, coordination, and control of air defense forces.

The provision of these networks involved the design and manufacture of switching systems, control panels, plotting equipment, multichannel radios, radar, mobile vans, generators, and even furniture—and then field testing, combat testing and redesign. The communications industry in close cooperation with the military and other industries quickly turned out

equipment for elaborate and successful air defense systems.

In fast moving mobile warfare, wire communications proved too slow. Telephone and radio firms developed point-to-point radio relay that provided the mobility needed for use by fast-moving, far-ranging mobile troops, such as Patton's Third Army.

In the field of photography great advances were made in aerial reconnaisance which developed into a vital source of information of enemy strength and disposition and of the effectiveness of aerial and artillery bombardment.

This brings us up through World War II, and here is where we Americans made a big change in our usual mode of postwar life. Instead of almost completely disarming and withdrawing to our continent, we found it necessary to assume an unaccustomed leadership in the free world. A new set of enemies had quickly replaced the defeated ones, and reluctantly, but of urgent necessity, we found ourselves in an arms race and power struggle with the Communist world.

With a rapidly developing science and technology which surprised nearly all of us, and continues to do so, Russia has devoted her entire resources towards the domination of the earth.

The science of modern warfare has reached a horrifying stage where personal or national ambition or even momentary insanity could touch off a holocaust that could destroy civilization and perhaps humanity.

So, as never before in peacetime, the civilian forces of science and industry of our country have been asked by the military to make the greatest possible progress in developing defensive and offensive military systems and weapons.

Here, I would life to refer back to my earlier mention of the radically new technique of warfare—the weapons system. The weapon may be a plane with a bomb or a missile with a warhead—but the "system" is provided by electronic communications, detection, control and guidance devices. The speed and range of modern weapons, their destructiveness and their expensiveness make such systems necessary in order to insure the efficient employment of the weapons. Because of the speed factor there won't be time in many critical moments for the human brain to effectively observe, calculate, communicate and direct them. The slightest error or delay might bring destruction to the wrong place with possible disaster to ourselves or our allies. And the high cost of the weapons in terms of productive capacity, manpower, time and materiel decrees that they be used with maximum effectiveness lest we suddenly disarm ourselves without doing damage to the enemy.

The materiel, the science and the skills that go into our dial and long distance telephone systems, into radio and television, and into electronic computers and business machines are the essentials for producing these weapons systems. There is probably not a single important manufacturer of electronics equipment that is not involved in work on the many systems being developed for the military. These systems are so complex, so extensive and involve so many different skills that most of them have been or are being developed as a team effort of many laboratories and firms.

Guided missile systems—such as the Nike, the Thor, the Titan and the Polaris—depend on electronics for detection, launching, timing, engine control, guidance to the target, homing on the target and communications back to the ground.

The systems approach is also being applied to our entire continental defense system. As in weapons systems development, a large part of the nation's communications and electronics industry has been called upon by the military to help develop, install and operate detection, warning and control systems and to help combine them into one vast coordinated system that can react instantly and harmoniously in bringing about maximum effective defense of the continent.

These continental defense systems are without parallel in history. Their costs run into many billions of dollars. Among such projects are: *The Dew Line*—the extensive arctic radar net guarding the northern approaches to our continent; *The White Alice Project*—the all weather military communications system for Alaska; *Sage*—the semi-automatic air warning and control system now being activated and which ties together much of the air defense activity of the continent; *Ballistic Missile Early Warning System*—being developed to detect oncoming enemy ballistic missiles, and *Missile Master System*—being developed to tie together all elements of antiaircraft defense by missile, from target detection to target destruction.

Illustrative of the magnitude of the job that industry is being called upon to do is the experience of the Bell System alone. About one-third of the 10,500 people at Bell Telephone Laboratories are currently working on projects for all branches of the military. Last year the volume of Western Electric sales to the government, mainly for materials and services associated with national defense projects, was about a third as much as the total volume of sales to all Bell Companies. Incidentally, more than half of this volume was provided by subcontractors and suppliers.

In continental defense the Operating Companies in the telephone and telegraph industries, as well as their research and manufacturing components, are playing an extensive and important role.

They were called upon to help provide manpower for engineering, management and construction of the Dew Line, of the White Alice project and of the Sage project.

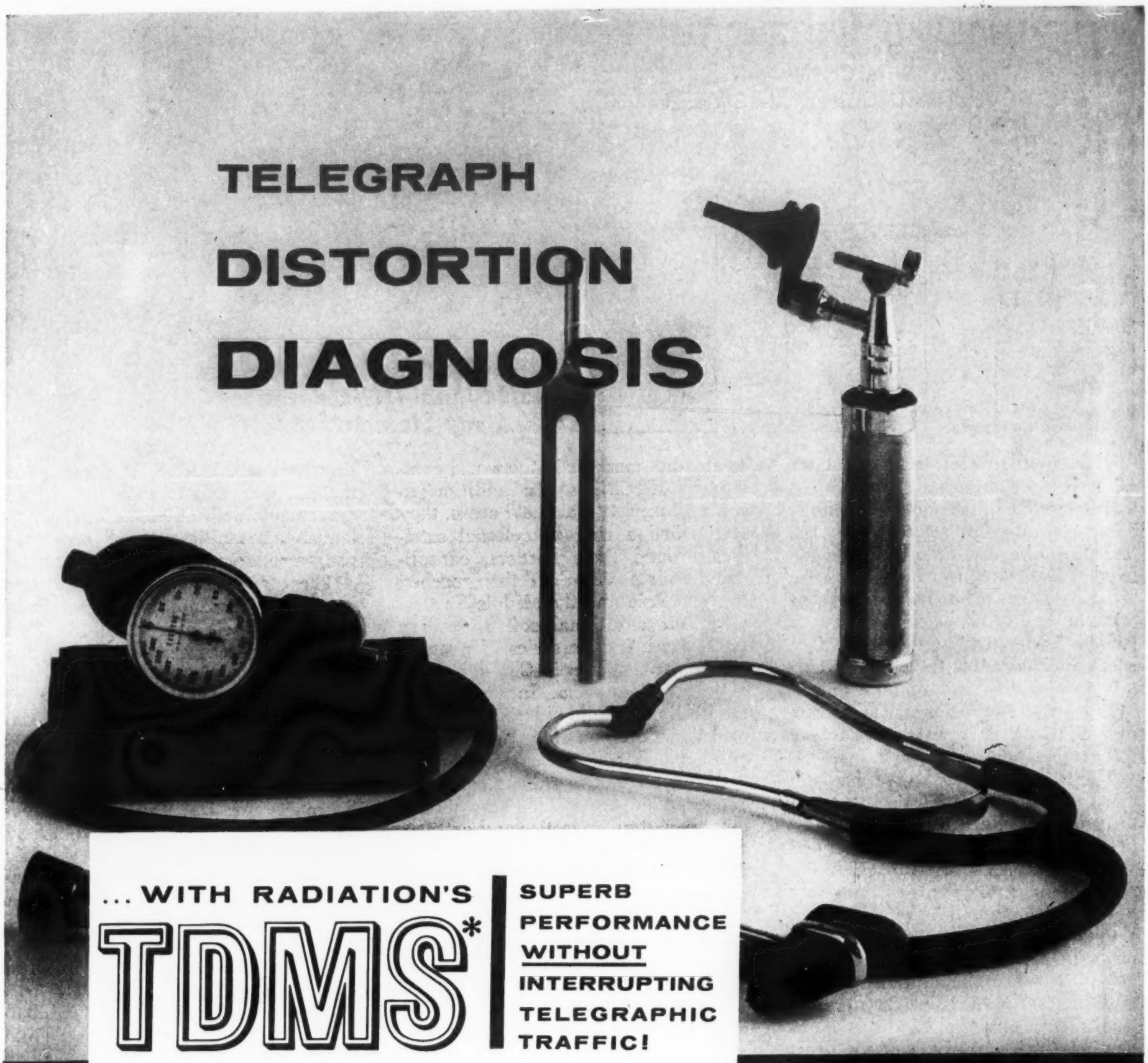
The Operating Companies have also been called upon to provide vast amounts of telephone, telegraph, teletype, private line and other services and equipment for air defense, civil defense and other communications systems needed for continental defense. In addition, the tremendous expansion in the postwar years of the nation's telephone system and of its cable and radio communications to other countries throughout the earth provides interior and exterior communications of tremendous military as well as civilian value.

In the photographic field great progress has been made particularly in developing and perfecting high speed and high altitude reconnaissance photography in keeping with the increasing speed and range of reconnaissance vehicles. Television is also being used for surveillance.

I have only touched on the larger developments. There are thousands of other projects, both large and small, for all branches of the military and all phases of defense and warfare in which the communications and electronics industries are engaged. They are fully involved, also. in developing military and industrial uses of atomic energy.

The challenge for survival in this atomic and space age is without precedent. The problems of tomorrow are tremendous, calling upon a full understanding and coordination of our national civilian-military team. It is reassuring to know that there is an association to promote a broad. friendly, personal and professional relationship for the maximum and most efficient development of our national strength; for definitely this is the purpose of the Armed Forces Communications and Electronics Association.

TELEGRAPH DISTORTION DIAGNOSIS



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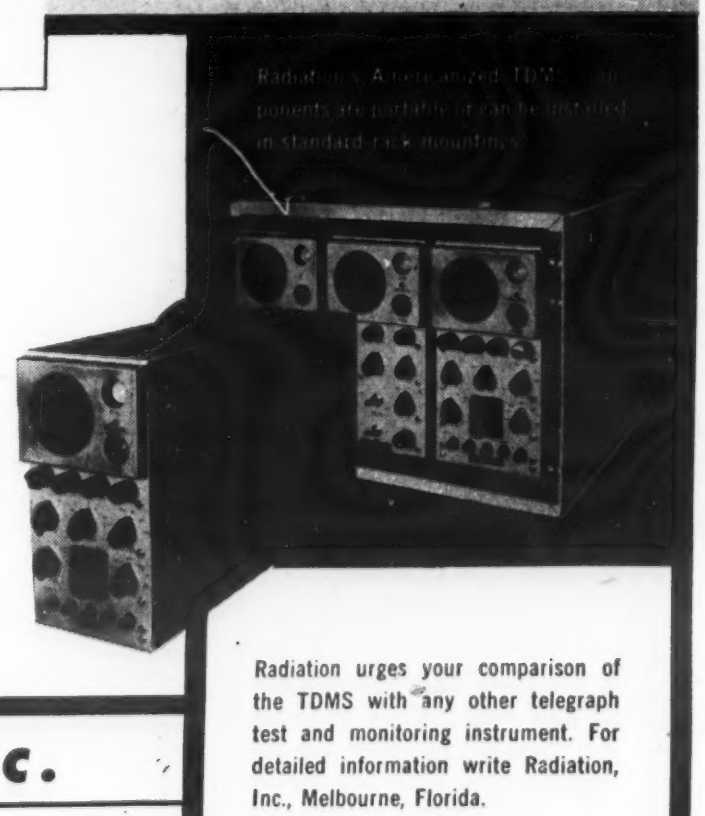

Radiation's Automatized TDMS components are portable or can be mounted in standard rack mountings.

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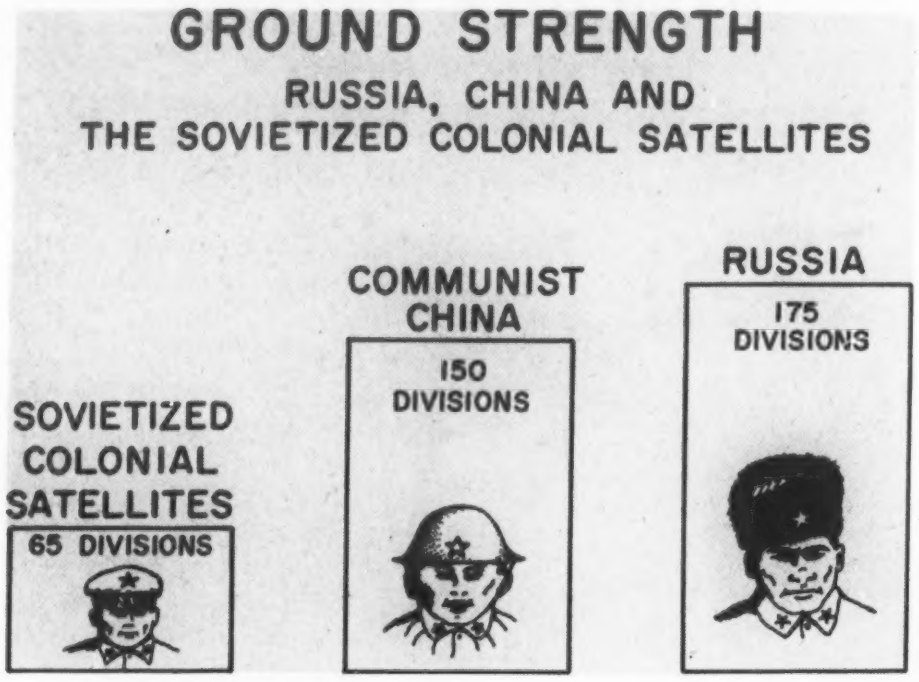


← Figure 1

THE MAAG'S PAY THEIR WAY

by Major Charles L. Bachtel, SigC
Staff Signal Officer
US Army Element, MAAG-UK

THE first several earth satellites have been launched. Their creators have stated that more will follow. After claiming for years to be the inventors of everything, the Russians have at last come up with a dramatic "first." They have publicly stated that their next two steps will be to launch a manned satellite and then effect interplanetary travel. We knew this was coming but didn't think it would be so soon, nor ahead of our own effort. Even a novitiate can see the handwriting on the wall.

The truth is, that a known ballistic missile capability now exists that can threaten the safety of the world. In the event the Russians put up manned satellite platforms that can circle the earth in controlled orbits, no spot however remote will be safe for long. Whatever development evolves, their peaceful intent can definitely be ruled out since the ultimate aim of the Soviet Union is world domination. Their direct and indirect intervention has already caused great harm and division of nations. This and the actions of their numerous colonial satellite nations should be sufficient evidence to clearly point out the facts.

As a point in fact, the current situation looks almost as nasty as it did in 1950 when the Military Assistance Programs (MAPs) were initiated and the Military Assistance Advisory Groups (MAAGs) were organized and placed into operation to administer them.

Soviet Intellectual Dishonesty Exposed

At the end of World War II, all nations, save Russia, demobilized in good faith and returned to peacetime endeavor, leaving the task of handling controversial international issues to the United Nations. It soon became evident that the Soviet Union did not possess the intellectual and moral ability to think, act and live as an adult member in the world community of nations. In addition to seizing formerly Nazi-held areas, they established a ring of colonial satellites around their borders, consolidated their position and then reached out into Asia and the Middle Eastern areas for additional soft spots. In rapid succession, a series of expanding events occurred in China, Greece, Malaya, Indo-China, Indonesia and the Philippines and culminated in the direct assault on the Republic of South Korea. This clearly indicated that the Soviets were out to divide and conquer the world. These actions plus their stalling tactics and extravagant use of the "veto" privilege in the United Nations forced our country and others to take necessary collective protective action. Accordingly, the RIO, NATO, SEATO and BAGHDAD pacts evolved. Area commands were established to build an integrated military deterrent to Soviet expansion and all free nations were invited to join in the establishment and manning of the common defense. In Washington, D. C., this month the 15 nations of NATO are meeting to celebrate their 10th anniversary and to consider economic, political and military questions relating to the security of the Free World. NATO has come a long way since April 4, 1949.

MAPs and MAAGs an Urgent Requirement

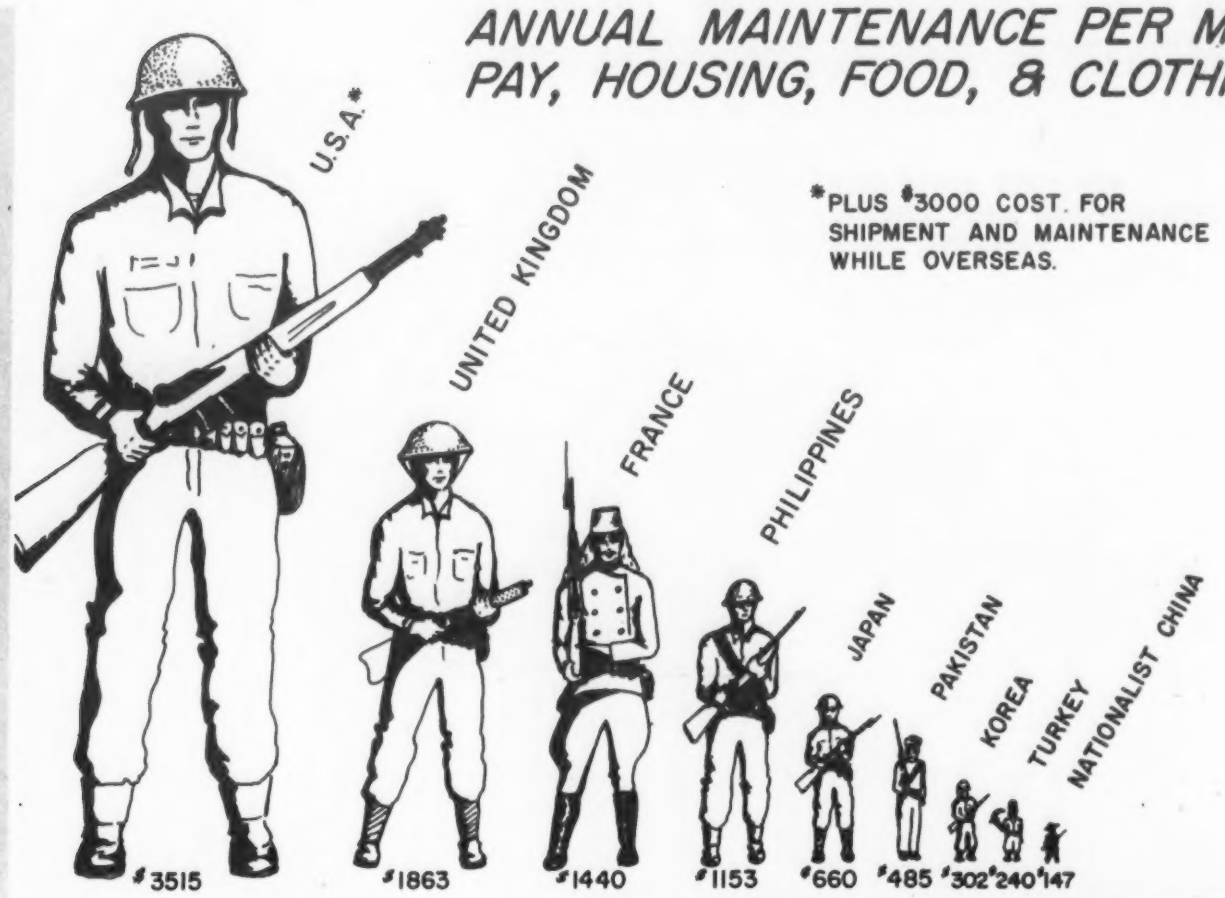
Entering into pacts and treaties revealed that more than just agreements were needed. Studies indicated that a great deal of both military and economic assistance was necessary if any degree of lasting collective security was to be achieved. To help our allies handle the job, Military Assistance Programs (MAPs) were initiated and Military Assistance Advisory Groups (MAAGs) established to administer them. History records why all the flurry of activity was necessary at this time. It also records that the decisions to enter into treaty agreements with other nations and to launch the military and economic programs were wise ones.

The communist world at this time was busy expanding its activities throughout Asia and the Middle East and was tightening its control on the European continent while at the same time increasing the size of its armed forces and that of its colonial satellites (see figure 1). Soviet intent was made quite clear and was neatly explained by our Assistant Secretary of Defense for International Security Affairs, Mr. Mansfield D. Sprague, when he addressed a meeting of the National Security Industrial Association, 12 September 1957—". . . The Soviet Union has the largest land Army in the world, and it is constantly being improved in quality and capability. . . . . It is clear that they are prepared to translate this military power into overt aggression at any time they believe it serves their purpose to do so. . ." It was with a similar general thought in mind that the pros and cons of the over-all situation were thoroughly aired in Congress. After much discussion and weighing all elements, the Mutual Security Programs finally were approved and the necessary implementing machinery set in motion.

At the time of the inception of the MAPs and MAAGs, the active ground forces of our allies added up to about 3.5 million men. The state of organization, equipment and training of these forces left much to be desired. Basically, this was the backlash effect of World War II, apathy, and the anti-Army, anti-officer, anti-anything-military attitude that prevailed at the time. However, in less than five years, over 1.25 million troops were added to the ground forces of

(*Continued on page* 16)

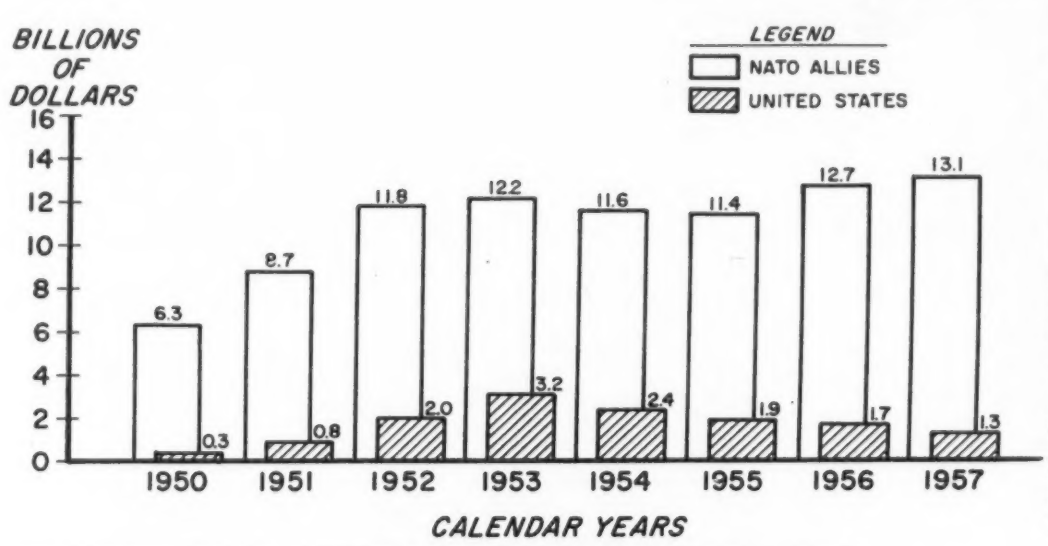
Figure 2 →



NATO DEFENSE EXPENDITURES AND U. S. MILITARY ASSISTANCE

EUROPEAN NATO INCLUDING GREECE AND TURKEY

REF: SUMMARY PRESENTATION, FY 1959, THE MUTUAL SECURITY PROGRAM, DEPT. STATE, DOD, ICA, FEB. 1958



← Figure 3

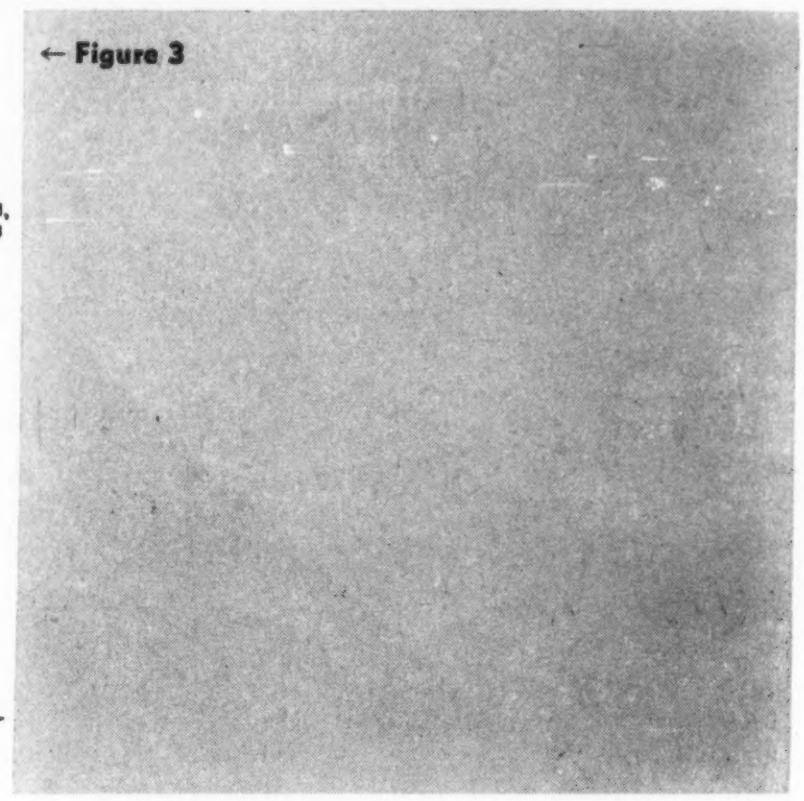
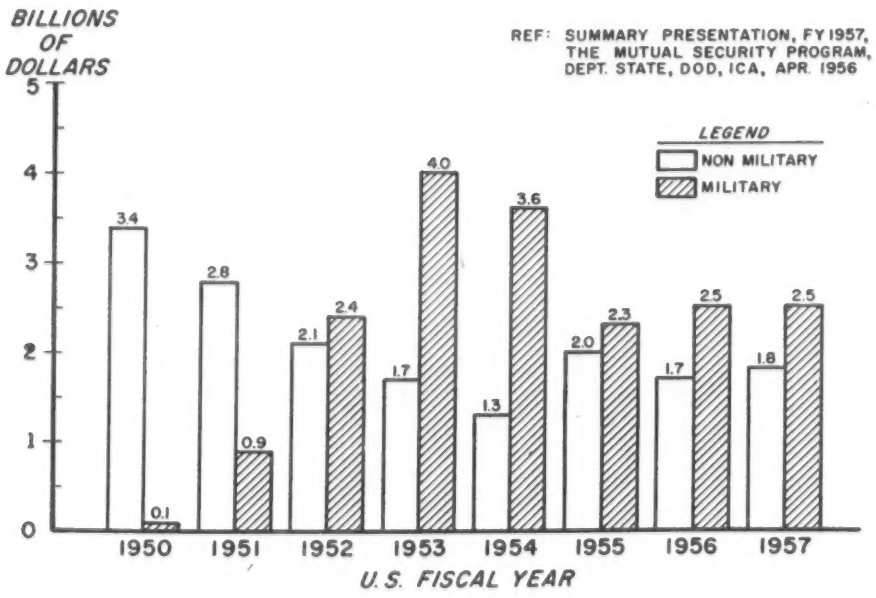


Figure 4 ↓

MUTUAL SECURITY EXPENDITURES

REF: SUMMARY PRESENTATION, FY 1957, THE MUTUAL SECURITY PROGRAM, DEPT. STATE, DOD, ICA, APR. 1956



MUTUAL SECURITY PROGRAM
FISCAL YEAR '57
MILLIONS OF DOLLARS

REF. ICA OPERATIONS REPORT 30 JUNE '57

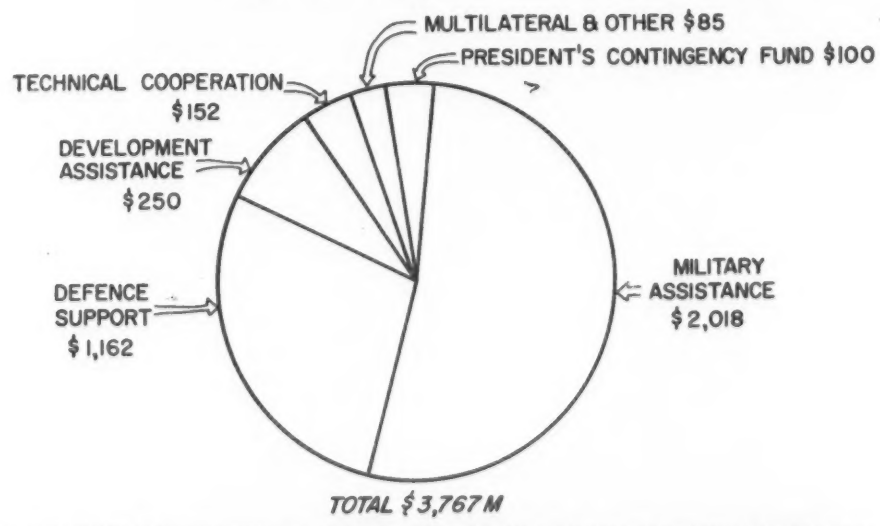


Figure 5 ↑

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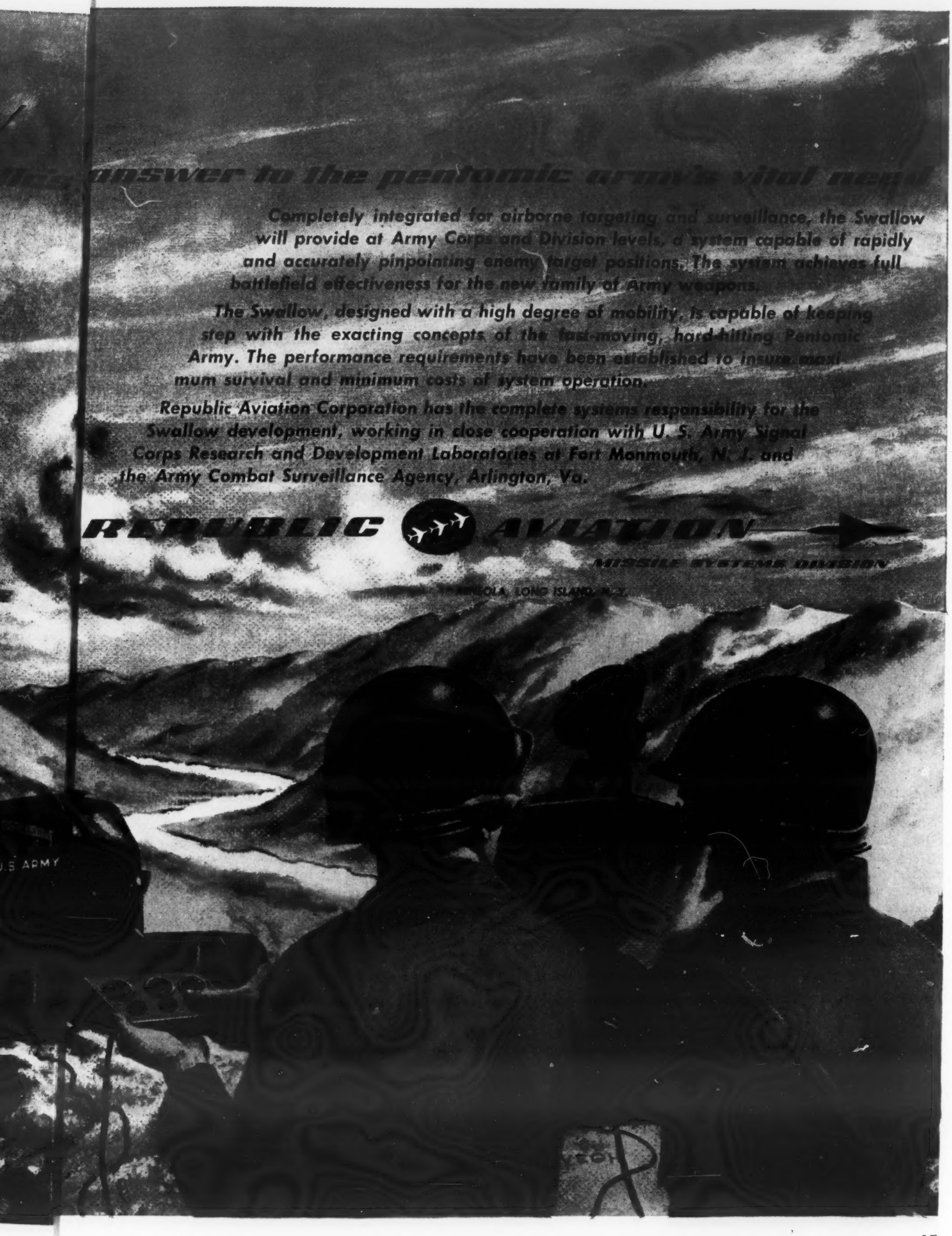
U.S. ARMY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Completely integrated for airborne targeting and surveillance, the Swallow will provide at Army Corps and Division levels, a system capable of rapidly and accurately pinpointing enemy target positions. The system achieves full battlefield effectiveness for the new family of Army weapons.
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Republic Aviation Corporation has the complete systems responsibility for the Swallow development, working in close cooperation with U. S. Army Signal Corps Research and Development Laboratories at Fort Monmouth, N. J. and the Army Combat Surveillance Agency, Arlington, Va.
REPUBLIC AVIATION
MISSILE SYSTEMS DIVISION
FARMINGDALE, LONG ISLAND, N. Y.
U.S ARMY

The MAAG's Pay Their Way

(*Continued from page* 12)

our Allies and their Navies and Air Forces were increased many fold. In addition to increased numerical strength, all forces were better organized, equipped and trained, higher in morale, combat effectiveness and combat support facilities. This build-up in the strength of the Free World enhanced international security at a time when it was sorely needed and at a price far less than trying to effect the same security through the use of U.S. forces alone (see figure 2). At the same time, it built up the mobilization and industrial bases of these nations and their economic structures.

Revitalization of National Self Respect

World War II and its aftermath left many nations in serious economic condition. Everything except trouble was in short supply. National pride, dignity and self respect of many nations were in dire need of revitalization. Amid this type of atmosphere the communists were busy sowing the seeds of dissension and unrest. In many instances this was the type of situation that the MAAGs found when they started their operations.

The tasks of the MAAGs were numerous and difficult and many prejudices and local obstacles had to be overcome but gradually each side gained in stature and confidence. Cognizance of the problems of others became evident by visits to neighboring countries and by attending foreign schools, thus creating a beneficial atmosphere and free exchange of ideas and know-how formerly totally unknown in many parts of the world. While the MAAGs worked to administer the Military Assistance Programs, the economies of these nations were being revitalized by offshore procurement and other direct and indirect economic assistance (see figures 3 and 4).

As time wore on, confidence began to return. As each nation became stronger economically as well as militarily, national self respect, pride and dignity again became firmly rooted and pushed communist influence and thought farther and farther into the background. Now, at this late date, when the luxury of a little bit of "hind sight" can be afforded, it can definitely be said that the whole program was entirely successful. At no time in history has such a massive experiment affecting so many people been carried on with so great a degree of accomplishment. Of special significance is the fact that this huge program was carried out on a world-wide basis and with the use of such a relatively small force of American personnel. This is a clear-cut indication that our systems of planning and organization as well as the training of the personnel concerned are superb and can, through perseverance and ingenuity, overcome language barriers, misunderstandings and obstacles of many kinds. This is a clear-cut victory for our Military Establishment, especially the Army, since it bore the largest share of the burden. The work of the MAAGs definitely deserves great credit and praise.

However successful our past accomplishments have been, we must not become complacent nor blinded by them. While the MAPs and MAAGs have been deterrents to war and communist expansion since 1949, several recent disturbing factors have appeared. Despite repeated warnings from NATO chiefs, several countries have reduced their NATO forces or have shifted forces to other locations under the guise of "increased firepower of new weapons," etc. Actually, this should be construed as a political development and a retrenchment ruse based upon calculated risks they are taking. Most people agree that where the Russians are concerned, a calculated risk is dangerous. However, while the political chessmen are being moved back and forth, the MAAGs continue to work on modernization programs, standardization and better understanding between the respective military and industrial agencies of all countries allied to the common cause of freedom.

The job is far from complete from a long range and lasting point of view. If we expect to obtain maximum and lasting results from our investments of time, materials and money, the MAPs and MAAGs should be continued for the forseeable future. This is no time to drop the ball at the mid-field point. Each year the military programs and requirements of all nations receiving military assistance are individually and collectively re-evaluated. As the countries concerned become more self sufficient, they provide a greater portion of their own needs. Due to continuing programs, the percentage and type of military and economic aid vary only slightly but a lesser total amount is now required (see figure 5). The advent of the Sputniks may change all of this, since guided missiles of varied types may have to be included in the aid programs. In this event, military modernization programs may also have to be speeded up and carried o ahead of schedule. This would na urally spark-plug another big aid pr gram since not all countries posse the capability of manufacturing thes weapons and providing the repai parts and highly trained technician for the maintenance required. In es sence, this amounts to how much in surance the Free World can afford "not to buy" if we drop the ball now

MAAGs Should Not be Skeletonized Nor Eliminated

The near-completion, percentage-wise, of the delivery of equipment and material for the Mutual Security Programs currently being administered is not a valid reason for materially reducing or eliminating the MAAGs and writing off the MAPs as being completed. Training and guidance are continuous processes that need constant monitoring and expert attention. The availability and use in Allied countries of hand-picked, highly trained American specialists, is definitely a great credit to all concerned and adds materially to the prestige of our country. In addition, the very presence of our people helps to achieve a "meeting-of-the-minds," exerts our influence on thought and equipment, insures continuity of programs, assists in standardization and promotes a general better understanding on all matters. Further, since the agencies and personnel that the MAAGs deal with are of far-reaching influence and importance, the social contact made with these various elements and with their families is of the utmost importance and will provide lasting benefits. We need all the friends and influence that we can get these days and this is one way of insuring the continued friendship of peoples of many lands. In my opinion, this is one of the basic reasons behind President Eisenhower's letter of 12 July 1957, sent to all overseas military personnel. In part, it read as follows: ". . . As members of our Armed Forces stationed overseas, you and your dependents are representatives of the American people with the essential mission of building good will for our country. . . . . Thus you represent us all in bringing assurance to the people you meet that the United States is a friendly nation and one dedicated to the search for world peace and to the promotion of the well-being and security of the community of nations. . ."

The MAAG job has been superbly handled in every respect and reflects great credit upon our Armed Forces and our nation. "A little more grape please, Captain Bragg."

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materials for the new technology

by

Dr. A. V. Astin
Director
National Bureau of Standards

WE are on the edge of a new technological era in which the changes to be wrought stimulate the imagination. Yet if we are to achieve an effective transition from the present into this new world, we must come to grips with and solve some problems of considerable scientific urgency. They are problems of principal concern to the chemist, for it is he who must provide the essential link between the laboratory and the materials of tomorrow.

Now what are these problems? They are problems of developing materials of ultra high purity in sufficient quantity and with sufficient control to further research and development and, in a number of cases, to satisfy production requirements. For the research scientist, such pure substances will be basic tools for understanding materials and material-systems and for engineering materials of such precise characterization that their performance under specified conditions will be reliable. To the world of technology, such a prospect is relatively new. For in most production activities, design engineers and line technicians have been dealing with catalogue-materials, materials which will be considered gross in comparison with the purity or homogeneity or precise characterization of tomorrow's materials. Now we are talking about ultra pure substances produced in quantity. When it is considered that specialized conditions and procedures must be reproduced on a production scale, we realize the technological extent of these problems.

Basically we are expanding faster technologically than contemporary knowledge of materials would allow. This is further complicated by the fact that we cannot slow down this technological growth, a condition which requires that we acquire with dispatch a high order of control over nature's resources. Again, these are problems that fall within the special interest of the physical chemist using the most advanced measurement and control techniques.

That these problems are both urgent and current has become evident in a number of different ways. In the first place, military agencies are now coming up against operating requirements and novel conditions where extremely specialized equipments and materials are being sought. In many cases, materials abnormal to nature are in demand. Industrial organizations serving the military are being hard pressed to satisfy quantity demands for exotic alloys. Research laboratories are being asked to revise their small-quantity techniques for use on a larger scale. Scientific expansion has created its own bottleneck. Our materials sciences have lagged behind practical requirements. We are now pushing present technological capabilities to their extremes. Materials systems are needed to perform satisfactorily at very high temperatures and others at very low temperatures.

Materials are required for radically new propulsion systems, systems which will create or operate in temperatures, speeds, pressures, and thrusts far in excess of anything contemplated, say five years ago. Materials are needed to serve as skins and protective coatings for vehicles which are expected to operate in out-of-this-world situations, coatings which can withstand violent corrosion or which have high emissivity or reflectivity characteristics. Highly pure substances are desired so that the addition of a precise quantity of a minor constituent will create a tailored coating whose emissivity values might satisfy a narrow region of spectral energy. New alloys, new lubricants, and new adhesives are being sought. There seems to be a substantial inventory of materials which still has to be developed for military purposes. In fact, the need is so widespread that we must shift our research gears, so to speak, in order that we may make a decent assault upon these materials requirements.

Nor are these needs restricted to military demands. The whole of technology is facing a radical changeover. Production itself is shifting to the

higher temperatures. Precision plastics, pure fluids and specialized gases are being sought for industrial applications. The production of ultra pure metals and of highly characterized metals now shows signs of becoming a major industry. We are on the brink of an era of mass-producing pure basic materials, materials which are near perfection, chemically speaking. All this is in the foreseeable future if only we organize ourselves to develop precision purification techniques where they do not now exist, extend them to a production scale where they do exist, and greatly enlarge our research effort for elucidating the properties of materials.

Costly Program

I am aware that this is no small undertaking for science and technology. I am aware that the methods of producing some of the pure materials are still unknown and that the quantities of some existing pure materials may be measured only in grams. I know that the specialists for taking on these problems are few in number. I know that the means for disseminating information on materials and on purification techniques are limited. Yet the expansion of technology is so pressing and the scientific requirements are so compelling as to impose an obligation for immediate action.

The problems of attaining high purity are not so much their novelty, although in individual cases unusual techniques are required. Despite this lack of novelty, however, present processes are burdened by elaborate procedure in order to attain satisfactory results with even minute quantities. This means that the research and the development is highly specialized and very costly. Thus it would not be economically feasible for most organizations to undertake the fundamental aspects of such an enlarged program.

Yet it is in the area of fundamental research that the materials sciences are lagging. Advances in technology are dependent on an enlarged effort to advance purification techniques and to characterize, with precision, essential substances. Applied research is dependent upon an accumulation of data, a massive accumulation of materials data on the basic properties of all types of substances extending to the most exotic. Engineering design of the future is dependent upon the ability of materials specialists to devise structural elements of special composition. Development activities, in many areas, are seeking such unique materials that it would be technologically convenient if the materials sciences were advanced to the stage where materials of precision composition could be "engineered" to specification. All along the chain of science and technology, there exists an anticipation of an enlarged basic research program to provide the bases for advances in materials technology.

National Research Center

Several important groups are giving intensive study to this problem. Tentative proposals that have come to my attention would place major responsibility for meeting some of the recognized needs in a multi-million dollar national materials research center to be financed with Federal funds. Likewise, we at the National Bureau of Standards have been greatly concerned with the national materials requirements because many of the problems to be solved have an immediate relationship to the area of our statutory responsibilities.

The Bureau's responsibility for the dissemination of standards and standard materials has a direct bearing on the current requirement for pure substances in materials research. To an appreciable extent the nucleus for a national materials research center already exists at the National Bureau of Standards. Accordingly, we have been looking hard to see how our own programs might be reoriented or augmented to strengthen our technical output to assist the nation's materials scientists in their special investigations. In addition, we have developed proposals for the consideration of the Congress which include a substantial expansion in the Bureau's effort to develop high purification techniques and to study and disseminate information on materials systems. The proposed expansion could be efficiently effected around current Bureau activities and would take advantage of specialists with long-standing competence as members of our staff. Thus, programs in the field of radiation physics and radiation chemistry, solid-state physics, spectroscopy, metallurgy, semiconductors, purification chemistry, and others can be conducted concurrently and on an interrelated basis. The Bureau's special facilities and measurement instrumentation competence will certainly be of added assistance to this enlarged program.

Bureau's Place

Three guiding principles provide the bases for understanding the bureau's plans for enlarged research activities on high-purity substances and highly characterized materials. First, major emphasis will be placed on basic research with the objective of improving purification and measurement techniques and the dissemination of information on these techniques and on the properties of basic materials to the scientific and technological communities. Second, our plans call for the creation of a center for the development, growth, improvement or purchase of highly pure substances for the common use of all scientists interested in materials research problems and for the development of a regular information program pertaining to the availability of these pure substances and related data. The final point is that the National Bureau of Standards will undertake research on substances and techniques only in those areas where there is inadequate research elsewhere, and where such research can best be performed by the National Bureau of Standards because of its unique facilities or because of its general value to science and technology. Thus, our plans take into consideration the on-going materials programs of other agencies, university laboratories, and industrial organizations. The Bureau's activities will support materials research by providing pure substances, techniques. and basic data. It will also provide for research where gaps exist, where theory and techniques of measurement are lacking, and where higher precision than is now attainable is required.

Now I have been talking about an enlarged high purity program at the National Bureau of Standards. We consider that the ideal purity of substance is something which requires a continuing research effort. We hope to arrive at the position where the attainable pure substance exceeds the requirement for such purity and to maintain this position in advance of technology. Our definition of purity in this context is as follows: *A substance is pure whose further refinement towards the state of ideal purity cannot be detected by any presently known technique.* You will note that this definition recognizes the continuous need for further purification and that it is not limited by what might be termed as chemical purity. Every kind of deviation from the ideal purity should be the subject of investigation and eventual control. In making these investigations, we will seek to exploit all available meas-

(*Continued on page* 21)

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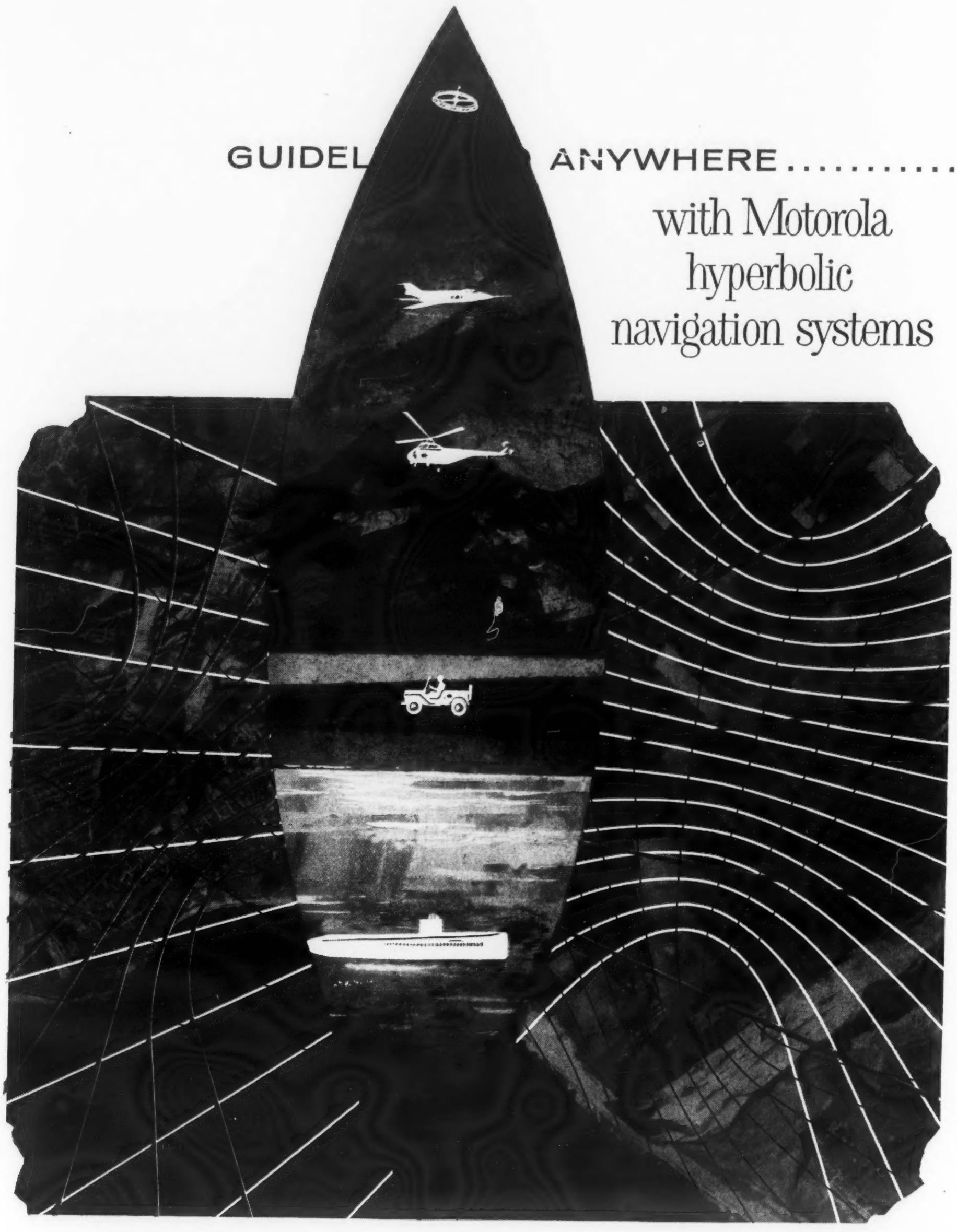

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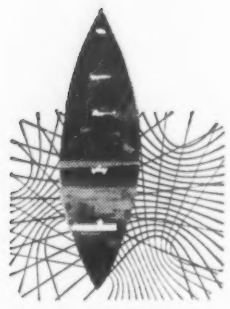

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Materials for New Technology

(*Continued from page* 19)

urement techniques, even those not conventionally associated with some materials. If we were to compare today's materials problems with those of ten to twenty years ago, we would note these differences: first, the number of highly pure substances required has increased sharply; second, this factor has been accompanied by an overwhelming demand for precisely characterized materials; and third, new developments in materials research techniques—such as those in zone melting, crystal growth, tracer analysis, activation analysis, vacuum purification, and electric furnace melting—now make possible the attainment of purities, in some cases, in tonnage amounts rather than in minute quantities.

Activation and tracer analyses have provided the means for a broader attack upon high purity problems. In addition, improvements in the separation process and in controlled measurement especially in the field of photodetection have made possible a large-scale attack upon today's materials problems.

One of the areas of materials research where there has been significant progress is that of semiconductors. Since the 1940's when advancing research in zone melting provided a basis for achieving purities in parts per billion for germanium and silicon, significant progress on various other semiconducting and dielectric materials has been effected. But today these very advances have created a demand far beyond present techniques and capabilities. Now there is a need for extensive basic research on the properties of various semiconducting materials, on improved methods for achieving purified materials, on controlled compound semiconductors, and on the application of these materials to various modern uses, including use in thermoelectric power devices. From an over-all research view, there is a need to establish a focal point where data in this field may be collected, catalogued, and disseminated. The National Bureau of Standards has maintained a program to provide standards and measurement techniques for this relatively new field of study. And it is included as part of the Bureau's plans for expanding materials research.

There are a number of other continuing programs which will serve as nuclei for stronger research activities. In the field of ceramics, extensive studies of the relationship of minor constituents to the major constituent in a near pure ceramic material is being investigated. While ceramists are requiring enormous amounts, sometimes in tonnage quantities, of high purified materials, they recognize the importance of the minutely added second component. In metallurgy, there has been similar appreciation of the role of trace elements in improving the properties of pure metals. It has been found, for example, that the addition of only two parts of boron to a million parts of steel will substantially increase strength properties. The addition of strontium as a minor constituent to titanate dielectrics will stabilize certain important phase relationships. Another interesting new phenomenon is that which is known as "whiskers"—highly purified thin metal strands with less than one dislocation per square centimeter. These whiskers have some of the most unusual characteristics of tensile strength, approaching that of the theoretical strength of the metal. How can we retain this property? How can we make it functional in materials systems? Thus, can be seen the necessity not only for the study of very highly purified substances, but also for the extension of these studies to include near-pure materials with minor imperfections.

In other programs, which are probably better known to physical chemists, the National Bureau of Standards has demonstrated its unique capabilities for purification research, materials characterization, and the dissemination of techniques, standards and standard materials related to chemical substances required for research and industry. For example, currently we are developing a highly purified alcohol with water as a minor constituent which might serve as a standard for nuclear magnetic reasonance studies such as required in the oil industry. Another very current example has an international flavor. The International Union of Chemistry has asked the National Bureau of Standards to prepare and distribute fourteen lots of four reference quantities of probably the purest benzene ever made. Three of the four reference quantities have minor constituents in differing concentrations. These are being supplied to national laboratories all over the world to test the reliability of the melting or freezing curve method of purity determination in certain representative cases.

Other examples of a similar quality may be cited. Instead, may I call your attention to the value of the

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Bureau's publications on purificatio methods. One publication of 1952 o a method for freezing zirconium o common impurities and for preparin zirconium sulfate and oxide pro vided one New Jersey company wit the technique for making larg batches of zirconium oxide. Tha company is now in profitable produc- tion. Another article on the prepara- tion of titanium tetrachloride of high purity serves as the basis for produc- tion control in the plants of two of this country's leading industrial chemicals organizations.

These examples from the Bureau's activities are not given out of a sense of demonstration but to illus- trate the variety and the range of our work in the field of pure sub- stances and highly characterized ma- terials and to show how directly this work bears upon the current national materials need.

I have stated that the Bureau is planning to strengthen its activities by building around established pro- grams and by creating new projects to serve special needs. One of the proposed new Bureau activities is the creation of a National Pure Crystals Bank in support of materials research throughout the country. The Bureau proposes to develop, grow, or pur- chase the purest single crystals no matter where in the world they are prepared. Then the Bureau plans to study the basic properties of these crystals and to disseminate these data. These crystals will be made available on loan to research labora- tories to increase the effectiveness of materials research programs through- out the country. In this way we hope to provide for a greatly enlarged re- search effort which will make use of materials scientists in all of the na- tion's laboratories.

Now, having discussed programs and examples of materials research projects and the need for them, I should like to conclude with this fundamental point. Today, there is a more general purpose attached to this quest for the highest purity in substances. In high purity we find the basis of all knowledge of materials. Having approached as close as we can to ideal purity, having studied a substance in its purest form and having characterized its properties, we may then begin to understand how these substances are altered by the addition of minor constituents in highly precise amounts or by a change in the atomic lattice. In this way we may surely develop new basic knowledge of the structure and char- acter of matter.

LITTLE ACORNS

by HAROLD W. CASTNER

THE EARLY PHILOSOPHER who observed that: "Great oaks from little acorns grow" probably had in mind the varied human experiences and accomplishments which, like the acorn, provide the humble beginning from which develops the great oak in all its majesty and strength.

This is a story of three little acorns who, like many of their kind, had fallen on fertile electronic ground and watered by the Hertzian rain and the warm Marconi sun, timidly pushed their tender roots into the soil and bravely shot their first leaves upward into the strange and fascinating realm of atmosphere and ether.

Having bravely put forth a few shoots, they discovered that they were living in a great forest of sturdy oaks, and, strange to say, each one had a name. Before long they became acquainted with many of them and learned that three large ones nearby were known as "Count Alessandro Volta" "George Simion Ohm" and, "Andre Marie Ampere." Nearby, were others named "Michael Faraday," "Joseph Henry," James Watt" and "Nickola Tesla."

After a time they learned the names of many others and found them to be very interesting and friendly and on learning more of these great oaks, the little ones sincerely hoped they would grow up to be like them.

Like all the other little acorns, these three were Alessandro Fabbri, Cheslie C. Chisholm, and, Harold W. Castner. The time was late in the nineteenth century and early in the beginning of the twentieth century, these little acorns had grown to be promising youngsters, and eager to know more of their great neighbours who stood about them.

We have appropriated the allegory of these three individuals and the little acorn, in the belief that it applies to all who became interested in Wireless Telegraphy at the beginning of the twentieth century. These three were no different from many others, and up to the year 1912 we find a great many interested in this new science which revealed the truth of the discoveries of Herman Hertz in 1888. that some sort of an impulse passed through the ether when strange electrical impulses were produced, and that they could be detected at a distance.

From 1906 to 1912, as well as during the period from 1912 to the First World War in 1917, these three little acorns were quietly growing and were struggling with magnetic detectors, coherer-tappers, homemade apparatus, galena, silicon, molibdonite, calco-pyrites, etc.

All three of these little acorns had shaken the ether long before 1912 with a varied assortment of spark coils having a presumed decrement of 2 10th, as well as 1 kilowatt drain-pipe transformers, straight gaps, and plate glass condensers.

When the nations of the earth decided that some regulations, relative to this strange art, should be agreed upon these three, in 1912, along with a host of their friends were formally licensed as radio amateurs, under the Department of Commerce, of the United States of America.

As it was internationally understood that frequencies of the spectrum from 200 meters down, were of little use, the amateurs were given this whole segment to use as they saw fit, subject to certain conditions.

A milestone was reached when Doctor Greenleaf W. Pickard discovered the rectifying properties of minerals, and we all gloried in the cat-whisker period. But when Flemming and deForest appropriated Edison's electric lamp and its ionic emission, to rectification, a new era dawned.

Who will ever forget those old Hudson Filament tubes and the auditrons, to say nothing of the UV 200's and 201 A's. There are those among us who remember copying POZ before World War I, by holding matches under the tubes and using homemade junk, consisting of box upon box of coils and condensers.

All went well until Kaiser Wilhelm decided to assert himself in 1917 and we awoke to a sudden realization that we needed a lot of communication and needed it fast. As far as communication was concerned, where were we to turn? There were a limited number of radio men in military circles and commercial shipping, but not a fraction of what was urgently needed.

All our little acorns had grown to be strong young trees and possibly were overlooked in the emergency, but before things could get going, someone looked and behold—this whole young forest came running to help. All three of our little acorns, as well as hundreds of their kin, came running pell-mell, thoroughly prepared and well trained for the emergency.

There was no draft in the U. S. Navy during World War I, but what did that matter. These young acorns were of the right sort and appreciated the privileges that had been given them heretofore. One little acorn, Fabbri, happened to be a wealthy man. He gave his private yacht to the government, bought a large country club, purchased a complete radio station, gave it to the government and, enlisted himself. Young Chisholm, rushed to the colors and Castner enlisted the

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Editor's Note: *The above article supplements Mr. Castner's Letter to the Editor,* "SIGNAL *Gets Around," which appeared in the February issue. Both articles deal with the author's many experiences with radio amateurs and set forth an interesting history of radio communication. Readers may wish to consult the previous article (Feb. pg. 22) for added information on the subject.*

National Headquarters is pleased to announce that the Banquet Speaker will be

The Honorable Leo A. Hoegh
Director
Office of Civil and Defense Mobilization

The Keynote Luncheon, accenting our 1959 Convention theme: "Communications, Electronics, Photography—Hallmarks of Outer Space" will be held Wednesday, June 3, at 12:30 • The Industrial Luncheon, which will be followed by a question and answer period on production and procurement, is scheduled for Thursday, June 4, at 12:30 • Panel Discussions will feature carefully prepared papers on timely subjects of interest in our three fields • An Army-conducted tour to an active site at Fort Meade will take place on Thursday, June 4 • The Annual Banquet, preceded by the reception and cocktail hour at 6:30, will be on Thursday, June 4, at 7:45 • One Hundred Exhibits will be on display above the Ballroom and in the Florentine Lobby of the Sheraton-Park Hotel. Our Exhibits Manager, Mr. William C. Copp, 72 West 45th Street, New York 36, New York, still can take a few more orders • The Amateur Radio Station K4NAA/3, located in the northeast corner of the hotel lobby, will be operating from 10:00 a.m. to 10:00 p.m. during the three days.

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Little Acorns (*Continued*)

first day war was declared.

It is rather amusing to recall that a Navy Chief Radioman was delegated to examine this young Castner, as to qualifications and experience in the art. We never claimed to be geniuses, but when we were asked if we ever heard of a volt or ampere, we humbly suggested that we knew more than that and to be brutally frank, it ended up that we examined him.

We learned that he reported to his superiors that they had an expert on their hands, who, through amateur and commercial experience was qualified to a rating of permanent Chief, at least.

We do not propose to dwell on personal experiences but suffice to say, all three of these little acorns, together with a lot more of their kind, were eventually all together in an insignificant little Navy radio station in Bar Harbor, Maine, in 1917. It signed AA2. Before long the country club was ready and this little effort moved to become K2B. From there on its rise was phenomenal.

It became a regular Naval radio station signing NBD and the number of men grew to over 500. We handled all the transatlantic communications and were the chief spark station as well. Before the war ended this station was declared to be the largest and most important radio station in the world. The commanding officer, the former little acorn Fabbri, was awarded the Navy Cross and a Citation from the Congress. The little acorn Chisholm, who was familiarly known as "Shorty," went on to become the communications officer who was voted the most popular radio officer in the South Pacific during World War II, and is now a retired Commander.

Castner finished his enlistment and became manager of a large wholesale radio firm in Boston, Massachusetts.

Near the close of hostilities in World War I, the first little acorn, Fabbri, had a picture taken of all three little acorns appearing in a later issue. There is nothing unusual about these three. They were simply experienced "Hams" who were trained completely at their own expense and who, through interest in amateur radio, were simply three of thousands who constituted a great reserve supply of talent when needed.

You can't make a useful radio man in "10 easy lessons," any more than you can make a silk purse out of a sow's ear. The Navy organized a huge radio school at Harvard University during World War I. Among all the hundreds who were given this 16-week course, we at NBD were sent the one at the top of each class. It is very important to note that of between 60 and 70 men we received, just one was of some use and in a minor capacity.

As was so amply shown in the December SIGNAL, the ham operator is certainly our greatest secret weapon and the Editor is to be congratulated in bringing it to the attention of all those in military communications.

If all communications men in the armed services will adopt the motto we used, there will be no limit to efficiency and accomplishments. "To do as well, you must do better."

From that humble beginning of a handful of trained hams at Bar Harbor, Maine, during World War I, the Navy is now building a $70,000,000 radio station which is the greatest the world has ever known, at Cutler, Maine. The great source of trained men can still be found in the ranks of the hams if it is ever needed in a national emergency.

by MAJOR GENERAL JAMES DREYFUS, USA

MANAGEMENT and CONTROL of MILITARY COMMUNICATIONS

Director for Communications—Electronics
Joint Staff

An editorial staff report in the January 1959 issue of SIGNAL *outlined the new organizational structure and objectives of the newly created J-6 (Communications-Electronics) Directorate of the Joint Staff, Joint Chiefs of Staff.*

At the request of the Secretary of Defense, the J-6 (Communications-Electronics) Directorate, of the Joint Staff with the cooperation of the Services, has prepared a proposed long-range concept and plan for the management and control of military communications. This plan has already been presented to the Office of the Secretary of Defense, by the Joint Chiefs of Staff.

In presenting this plan, the following areas will be discussed in some detail:

I. Concept
II. Requirements
III. Management and Control Responsibilities
IV. Policies
V. Implementation

Military communications are being provided at the present time by separately engineered service systems. Cross-servicing between systems exists to meet requirements of other military departments and government agencies for free exchange of messages. These systems have been expanded on an individual basis as new communications requirements presented themselves over a period of years. They are basically designed to satisfy the specific requirements of a military department, including support for the techniques and weapons systems of modern war. Although there has been considerable progress in integration of existing systems, the control of communications has always been said to be an element of command: therefore, as command has changed to the Secretary of Defense, the control of communications also changes.

The Joint Chiefs of Staff will be responsible for the coordination and control of military long-haul circuitry and establishment of *one long-haul military communications network.* Operation of this fundamental network will be shared by the military departments. The objective is to obtain the communications that will best satisfy the requirements of the Department of Defense, the Joint Chiefs of Staff and the forces in the field with due consideration for economical aspects.

We foresee continuing improvement and modernization of the means and techniques available today. As I mentioned previously, tremendous advancements in firepower and weapon systems indicate the need for new nechniques in the field of communications. Our planning must be geared, not only to the techniques available today, but to take full advantage of the new techniques of the future.

In the interim, we should develop a global telecommunications network responsive to the requirements of all users. Requirements and facilities must be consolidated whenever and wherever possible, and our joint long-haul communications network must be designed to give us efficient utilization of our money, personnel, and equipment resources.

In furtherance of this philosophy, the Joint Chiefs of Staff, based on: (1) a review of Army, Navy, and Air Force plans for long-haul communications, (2) a review of the future unified and specified command structure and (3) the dictates of an ever tightening economical environment, have established the following concept for improved management and control of military communications.

The requirements of the department of Defense for efficient and economical long-haul communications will be met by the evolutionary conversion of the military department communications facilities into a Joint Communications Network.

The network will be operated by the military services on a single system basis and will be designed to readily provide facilities for command, control functions, intelligence, weather, logistics and administration.

System terminals will be operated on a single service or joint basis by the Service (or Services) requiring the facility.

The Joint Communications Network will include services and facilities as follows:

(1) The point-to-point services from the JCS to the unified and specified commanders and thence to their component and special task force commanders.

(2) The point-to-point services from the military departments to their respective major commanders and their subordinate organizational echelons.

(3) Sufficient other long-haul circuits to provide facilities for allocation to meet essential support and special requirements as necessary.

A mobile capability will be provided for extension of the Joint Communications Network into areas of special operations. Such extensions will be accomplished through the use of equipment packaged in such a manner that it can be withdrawn or relocated upon termination of the requirement.

Certain systems unique to a military service will not be included in the Joint Network. However, the design of the Joint Network and these unique systems must insure technical compatibility.

Under the heading of requirements come those four characteristics which have always been basic to modern military communications: Reliability, Accuracy, Flexibility, and Security.

In order to insure that the definition of the communications support required for today's and tomorrow's weapons and weapons systems is complete, two additional characteristics must now be separately identified and added to the list: Speed of service and capacity.

Communications in support of military requirements can be grouped in the following utilization categories:

- Command
- Operational
- Intelligence
- Weather
- Logistics
- Administration

The systems of the future will provide for the following modes of transmission, in varying quantities, on a world-wide basis:

- Voice
- Data
- Facsimile—Graphics
- Teletype
- CW (Emergency only)
- Video

Plans

The plan provides that management and control of Joint Communications will be established as follows:

(1) In accordance with policies of the Secretary of Defense, the Joint Chiefs of Staff will be responsible for concept, outline plans and guidance to the services and/or unified/specified commands for their detailed planning and implementation of:

First. the Joint Communications Network, and second, the communications system from JCS to unified specified commands.

(2) The unified/specified commanders will be responsible for planning for communications systems to their component and special task force commanders.

(3) The component and special task force commanders will plan for the necessary communications to support their operations.

(4) The military departments will be responsible for detailed plans and implementation of:

First, their assigned portion of the Joint Communications Network, including personnel staffing. Second, joint command communications plans as directed. Third, the communication services to their major commands and subordinate organizations. Fourth, communications integral to weapon systems. Relevant communications plans will be submitted to the Joint Chiefs of Staff for review.

The JCS, during this review, will verify:

(1) That the plan or requirement is in support of a JCS approved military requirement.

(2) That the plan supports future unified command structure for the area in question.

(3) That the most economical approach has been taken from both an operational and technical viewpoint.

(4) That the plan or requirement can or cannot be consolidated with similar plans or requirements.

As directed by the Secretary of Defense, the JCS will review communication plans of other Defense Agencies and Government Departments whose requirements have an impact on military communications in order to determine the most economical means of meeting the requirement.

The Joint Chiefs of Staff will recommend designation of cognizant programming, installation and operating service for development and implementation of the plan, whenever the Joint Communications Network is involved or whenever there are joint applications.

Operational Control

The operation of a Joint Communications Network is a task which requires fast reaction to changing conditions or requirements. These changes may be due to variation in traffic load, propagation difficulties. equipment failure, changes in command structure, expanding military operations, etc. In order to insure effective control of the Joint Network under varying conditions of peace and war, the JCS shall:

(1) Review and revise the existing controls to achieve the most efficient and economical use of all military owned or leased circuits and channels.

(2) Provide a capability for instantaneous ruling on circuit, channel, traffic control and procedural problems.

(3) Exercise control of the Joint Communications Network.

Policies

The policy portion of the plan outlines responsibilities of the Joint Chiefs of Staff and the military departments with respect to these items.

Budgeting and funding for weapon system networks will be the responsibility of the military department responsible for the weapon system.

Joint Communications Network requirements assigned to a military department for implementation will be budgeted by that military department as a JCS item. The Department of Defense will be required to establish funding procedures for the orderly implementation of the program. Maintenance and operating funds will be budgeted and controlled by the operating military department.

Communication sub-systems, components and equipments utilized on the Joint Communications Network and on weapons control systems will be *standardized* to the extent necessary to ensure the required compatibility.

Preparation of military or developmental characteristics for the Joint Communications Network will be coordinated by the Joint Chiefs of Staff to obtain the maximum economy and compatibility.

R&D for future *Joint* usage systems will be controlled by JCS through recommendations to the Secretary of Defense for the allocation of responsibilities to an individual Service, a combination of Services, or to Advanced Research Projects Agency. *R&D* for communication support of weapon systems will be the responsibility of the military department concerned. Unnecessary duplication will be eliminated in the research, development, and procurement of communication equipment. Each department will be permitted and encouraged to engage in component research and development to insure a limited multiple approach to the best equipment, so that the requirements peculiar to a military department are fully explored, and that maximum economy of procurement is realized. Whenever a military department is given authority to procure production quantities of a given item, the other departments will normally discontinue their research and development on this item.

Existing common universal procedures will be reviewed and revised as necessary by the JCS to insure adequacy for operation of the Joint Communication Network.

Priorities for the allocation of communication equipment resources will be established as necessary by the Joint Chiefs of Staff.

Implementation

Implementation actions for approved communications planning have been grouped under three categories: immediate, mid-range, and long-range.

(1) *Immediate* includes: Those plans which can be implemented within a period of six months. These plans will normally involve such items as procedural changes, circuit or network rearrangements, and minor equipment installations.

(2) *Mid-range* includes: Those plans which can be implemented in less than three years. Normally these plans will involve items of a "quick fix" nature. They will include change to, or modernization of, existing installations utilizing compatible equipment with little or no development involved.

(3) *Long-range* includes: Those plans which can be implemented within a three to ten year period. They will normally involve major changes or improvements which require research and development.

In summary, the proposed Joint Chiefs of Staff plan for the management and control of military communications will provide the Department of Defense with:

(1) A single long-haul communications system—the Joint Communications Network.

(2) A central management and control agency vested in the Joint Chiefs of Staff.

(3) Efficiency and economy of operation.

(4) Controlled development for the future.

Conclusion

I have explained how we in the Joint Staff propose to play our part in establishing effective control and management of military communications.

I would like now to expose you briefly to some of the facts of life with which we are faced in implementing this plan.

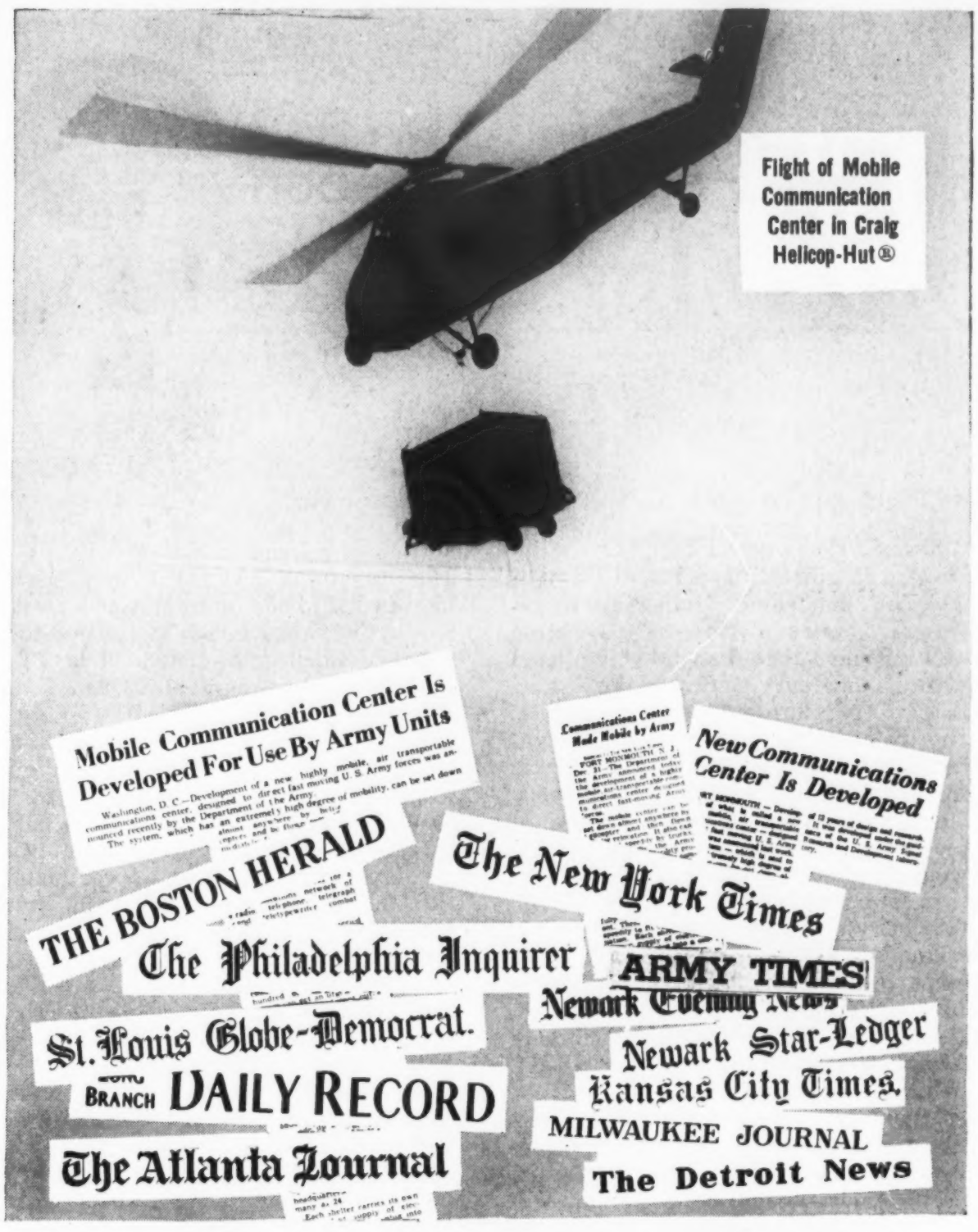
There is today a tremendous investment in communications equipment and facilities, which we can neither afford to junk from an economical point of view, nor could we from a technical and equipment availability point of view, replace these facilities on a short term basis —*even if we had the money.*

The conversion of the present three Service systems to a Joint Network will be one of gradual transition; probably extending over the next ten years.

We expect to do no consolidating of existing facilities simply for the sake of getting everyone under one roof. We do propose, however, that the present systems will be studied in detail; where consolidations are economically desirable and technically and operationally possible, such consolidations will be recommended.

As we move through the transition period, Joint Communications Centers will be established in areas of common interest. Transmission media will be planned and implemented on a single-system basis and any paralleling of long-haul circuits, or duplication of terminal and relay facilities, will be based on sound engineering practices, requirements for dispersal or other valid reasons which are fully justified by existing circumstances.

We know full well that we will require the assistance of industry to satisfy our end objective. The extent of this participation is not yet known, but it is certain to be extensive.



U.S. Army Signal Corps development makes news . . .

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america's obsolete weapon ? the radio amateu

by Sanford C. Curcie

SINCE 1944, WHEN I first became interested in amateur radio, and through the years immediately following World War II, numerous voices have kept me well informed as to the vital role played by radio amateurs serving in the Armed Forces or related defense industries. Shortly after the last world radio conference (Atlantic City, 1947), it was realized that the amateur bands below 30 Mcs. were in a constant state of jeopardy, and the tone of our propaganda underwent subtle changes. The theme switched from a reflection on past glory to a prognostication of future triumphs. I thought the "pitch" had come out into the open in the article by Brig. Gen. John Bestic, USAF, entitled "The Radio Amateur—America's Secret Weapon" (SIGNAL, Dec. 1958). While this title promised to foretell the role of amateur radio in the unhappy event of a future conflict, the story was a reiteration of the now-too-familiar "how-wonderful-you-were" World War II theme. Let us consider the circumstances of a third world conflict coupled to the realization that the "old gray spectrum ain't what she used to be," and take a critical look at the amateur, his equipment and the spectrum he lives in.

There are approximately 175,000 licensed amateurs in the United States today. This group represents every technical walk-of-life and virtually every income tax bracket; however, the overwhelming majority live somewhere between 3.5 and 30 Mcs. While a few venturesome souls have explored the wide-open spaces of six- and two-meters and above, the remainder are a most gregarious lot, preferring the comfortable mediocrity of store-bright, factory-built equipment with which to pursue endless stereotyped contacts, utilizing techniques and procedures virtually unchanged since the days of Hiram Percy Maxim.

U. S. amateurs occupy some very choice High Frequency (3-30 Mcs.) assignments. In the Western Hemisphere, they have a total bandwidth of 2.8 Mcs. (unshared) and an additional .5 Mcs. on a shared basis. Because numerous other services are on a "shared" basis in the HF portion of the spectrum, amateurs can be considered as having effective use of a 3.3 Mcs. portion of a band only 27.0 Mcs. wide. The remaining 23.7 Mcs. may sound like an awful lot of frequencies to the uninitiated, but when it is realized that this is divided and subdivided between the Mobile, the Aeronautical Fixed, the Broadcasting, the Fixed (point-to-point), the Maritime Mobile, Land Mobile and Standard Frequency Services of all the countries of the world, 23.7 Mcs. isn't much room. The hams may be surprised when they stop to consider that in 1951, approximately 116,000 frequency registrations were listed with the International Telecommunications Union, for the frequencies between 6.2 to 27.5 Mcs. By 1958, this total had increased to approximately 124,000 registrations for that band between 5.95 to 27.5 Mcs.

In order that we may justify holding the line on present amateur allocations, hams are going to have to awaken to the fact that the world of radio has come a long way in the past few years. Should we fail to keep abreast, it won't be too long before some government decides on a wholesale sacrifice of amateur HF frequencies to meet the ever increasing demand for additional spectrum space. The fact that the amateur, with key and microphone in hand, is sadly out-of-touch with present techniques will, I believe, contribute materially to his lessened war or defense utilization potential.

In this discussion we are not concerned with the "bright young thing" with a PhD. in physics; he's R&D material anyway. Rather, it is for us to consider what we can best do with the "communicators" i.e., the rank-and-file—those draft eligible amateurs available to the military in any future conflict. Query this individual on Forward or Tropospheric Scatter, on Tone or Time Division Multiplex, on Space or Frequency Diversity and he founders hopelessly in a strange world of unfamiliar communications vocabulary. Ask him to define FSK or to differentiate between a simplex and duplex circuit—though he uses the former in every contact he has ever made—the chances are good that he has never even heard the terms used.

After being taught the fundamentals of military life, had his code speed beefed-up to include Cryllic, mastered procedures and instruction on how to differentiate between various modes and emissions, most of which (A-1 and A-3 excepted) he has never heard of, our amateur might then be ready for duty in the field—but so would his non-amateur friend.

As an active ham, I realize all too well that our hobby is subject to costs that are on an upward spiral. Many amateurs have felt the budget pinch when caught between family needs and equipment desires. In the hope of alleviating some of this pull on the pocketbook, to stimulate the pioneer spirit which made amateur radio a truly great hobby, and to give the hams a chance to help themselves, I would like to offer some suggestions combining government, industry, the Armed Forces and the amateur himself.

Proposal One is to shift the present Novice Class sub-allocations out of the HF bands and up into the six- and two-meter bands and, further, to require all newly licensed amateurs to spend between three and five years *actually operating* in these bands. When the term of this license has expired, the individual would then be re-examined by the Commission before being allowed to operate anywhere between 8- through 10-meters. This, I feel, would greatly stimulate interest in, and in turn generate, a greater demand and market for amateur UHF/VHF equipment.

Proposal Two would suggest that various companies help in making their obsolete equipment, especially printers, reperforators, etc., available to amateurs. A small yearly rental and deposit fee might be used to finance the cost of conducting a few evening classes on the care and maintenance of the machines.

Proposal Three is made in the belief that the Armed Forces could make a greater specific effort towards recruiting amateurs into the reserves. A Signal Corps reserve unit, composed chiefly of hams, would offer an opportunity to train with modern equipment along with the advantages of paid drills, summer camp, etc. For many, it would be a wonderful opportunity to work with new equipment and techniques and could be made into a highly rewarding endeavor, accruing substantial benefits to the individual, the Armed Forces and the nation.

— GOVERNMENT —

THE AIR FORCE has selected ITT and RCA as associate contractors for the multi-million dollar, long-range modernization and expansion of its global communications system, 480L. ITT will direct the over-all development, design and master planning of the system, also known as AirCom, having Hoffman Electronics Corp. and Hughes Aircraft Co. as major subcontractors on its team.

ARCAS (All Purpose Rocket for Collecting Atmospheric Soundings), the revolutionary new low cost meteorological rocket that can be launched by a 2-man crew, has been successfully fired by the U. S. Army Signal Missile Support Agency, White Sands Missile Range, N. M. The rocket eventually will be made of finely spun glass fibers so that it may be fired over populated areas and be exploded into harmless fragments after it has gathered and transmitted needed data. The rocket is 7 ft. in length and 4½ inches in diameter, weighing 71 lbs., complete with a load of slow burning solid fuel and was made by Atlantic Research Corp., Alexandria, Va.

FORT MONMOUTH, N. J. The U. S. Army Signal School has formally accepted its newly-expanded closed circuit television system. RCA manufactured the studio system and receivers, while Jerrold Electronics Corp. engineered and installed the expanded seven-channel cable distribution system over a ten-mile network to 487 outlets. At this inauguration of the world's largest military closed circuit TV system, the Jerrold Corp. presented to Fort Monmouth its annual award for "pioneering the developing of closed circuit television as an educational medium in military training."

A BILL TO BAN ELECTRONIC EAVESDROPPING of private conversations or of electrical communications, except by federal law enforcement authorities authorized by a federal judge or US commissioner in the investigation of a federal crime, has been introduced by Sen. Kenneth Keating (R., N.Y.). The bill is designed "to protect the right of privacy against unauthorized invasion and, at the same time, to facilitate the fullest use of scientific methods of crime detection by law enforcement agencies."

30 NUCLEAR-POWERED SUBMARINES are now under construction or in operation by the Navy. The New York Shipbuilding Corp., Camden, N. J., and the Ingalls Shipbuilding Corp., Pascagoula, Miss., each have been recently awarded the construction of 2 nuclear-powered attack submarines (SSN) under fixed-price contracts totalling $45,389,098 and $49,178,142, respectively. Mare Island and the Portsmouth Naval Shipyards each have been assigned construction of 1 SSN.

CONTRACTS: ARMY: General Instrument Corp., production of new miniaturized, airborne radar "beacons" which will "more than triple" the normal range of ground radar, $2,500,000; Raytheon Manufacturing Co., production of Hawk Missile System, $50,731,000; Stromberg-Carlson Div. of General Dynamics Corp., combat communications facilities, $12,644,000; Philco Corp., G & I Div., general purpose digital computer called Com-pac, $500,000. Navy: Lockheed Aircraft Corp., purchase of a modified Electra prop-jet transport, $8,000,000; Sperry Gyroscope Co., Div. of Sperry Rand Corp., production of missile guidance radar units, $51,900,000; Hoffman Laboratories Div., Hoffman Electronics Corp. modification and improvement of existing TACAN air-navigation equipment, $3,300,000; National Co., no-drift radio receivers, $5,500,000. AIR FORCE: Sonotone Corp., military jet battery units, $1,800,000; Keithley Instruments, Inc., development and manufacture of a number of micro-microammeters for use in satellites and research missiles, $93,580; Republic Aviation Corp., research work, $725,000.

"THE POST OFFICE OF TOMORROW" is to be built and equipped by Intelex Systems, Inc., a subsidiary of ITT, at Providence, R. I. The world's first fully mechanized mail processing plant and post office will be constructed at an estimated cost of $20,000,000 and leased to the Post Office Department for 20 years. The annual rent will be approximately $1.4 million during the 20-year lease period, plus maintenance costs for plant and equipment. Construction started April 2nd, and this so-called "Project Turnkey" is scheduled for completion in September, 1960.

DIRECTORS OF RAYTHEON MANUFACTURING CO., Waltham, Mass., and Machlett Laboratories, Inc., Springdale, Conn., have approved an agreement providing for the merger of the two companies, subject to approval by stockholders. Under the agreement, Machlett would continue to operate under its own name, but as a division of Raytheon. Machlett is a pioneer producer of X-ray tubes and also manufactures high-power, high-voltage electron tubes. The joint statement said there is "virtually no overlap" between Machlett products and those of Raytheon, the latter producing a broad range of electronics equipment for government and commercial use.

LITTON INDUSTRIES, INC. HAS PURCHASED THE TIMES FACSIMILE CORP., a subsidiary of The New York Times Co. Times Facsimile develops and markets facsimile equipment for transmitting and recording pictorial and graphic material. W. Preston Corderman, a Litton Vice President, will become President of Times Facsimile, which will operate as a division of Litton.

CIRCUITS INSTRUMENTS INC., wholly-owned subsidiary of International Resistance Company, Philadelphia, Pa., has been merged with IRC. Its name has been changed to International Resistance Company, Circuit Instruments Division. This St. Petersburg, Fla. division manufactures miniature single and multi-turn precision potentiometers for use in guided missiles, automation and atomic installation electronic equipment, and other related devices.

A MERGER is being considered by Radiation, Inc., Melbourne, Fla., and Levinthal Electronic Products, Inc., Palo Alto, Calif. As proposed, Levinthal will become a wholly-owned subsidiary of Radiation and will continue operation under present management. Both companies design and produce advanced electronic equipment in complementary fields. Radiation is known primarily for telemetry and digital data processing systems and Levinthal for radar, electro-surgical, medical and nucleonic equipment.

REDUCING PRE-PRODUCTION "COST BARRIER" military services and other defense agencies will get more for their money and quicker delivery of defense "hardware" through a newly perfected cost-reduction and time-saving system developed by the Westinghouse Electric Corp., Air Arm Div., near Baltimore, Md. Known as MMI (mechanized manufacturing information), the new system, which utilizes specially designed semi-automatic and automatic business machines, will significantly compress the time element involved in getting new military developments from drawing into actual weapons systems needed for America's defense.

SERVOMECHANISMS, INC., Hawthorne, Calif., and Laboratory for Electronics, Inc., Boston, Mass., are considering a merger plan on the basis of 2 3/4 shares of Servomechanisms to one share of Laboratory for Electronics. Laboratory for Electronics is primarily engaged in electronic navigation and radar systems, while Servomechanisms is a leader in electromechanical systems and components.

NORTH ELECTRIC CO. has purchased from RCA all designs, manufacturing equipment, machinery and tooling used in the manufacture of their line of relays. North will supply these relays to RCA customers without interruption. Machinery and equipment are now being removed from RCA's plants in Camden, N.J., and are expected to be set up and operating in the Galion, Ohio plant in April.

AN INDUSTRY DEFENSE AND MOBILIZATION COURSE is scheduled to be given at the OCDM Staff College in Battle Creek, Mich., June 22-26. Those who have the responsibility for emergency and disaster control planning in industrial plants, institutions and other large buildings and facilities are urged to attend. Enrollment in the course is limited and applicants will be enrolled in the order of receipt of their applications. Enrollment forms and other information may be obtained from State Civil Defense Directors, or from the Office of Civil and Defense Mobilization in Battle Creek, Mich.

— GENERAL —

ON THE OCCASION OF THE 10TH ANNIVERSARY OF THE SIGNING OF THE NATO TREATY a meeting of the North Atlantic Council in Ministerial Session was held on 2, 3, and 4 April, in Washington, D. C. At present the agenda details are classified.

THE 1959 APPRENTICESHIP CONFERENCES (AC) which are sponsored by employer and labor groups, assisted by State Apprenticeship Agencies and the Bureau of Apprenticeship and Training of the U. S. Department of Labor, have the following schedule: 15th Annual EASTERN SEABOARD AC, Providence, R. I., Sheraton-Biltmore Hotel, June 15-18; 3rd Biennial MIDDLE ATLANTIC STATES A & TC, Wilmington, Del., DuPont Hotel, July 13-16; 11th Annual SOUTHERN STATES AC, Charleston, S. C., Francis Marion Hotel, July 23-25; 3rd Annual NATIONAL RAILROAD AC, Omaha, Neb., Sheraton-Fontelle Hotel, Oct. 7-9; 1st Biennial NORTH CENTRAL STATES AC, Indianapolis, Ind.,Antlers Hotel, Oct. 28-29. The state conferences scheduled are: FLORIDA AC, Daytona Beach, Fla., Beach Plaza Hotel, May 22-23; 9th Annual OHIO STATE CONFERENCE, Cincinnati, Ohio, Sheraton-Gibson Hotel, Oct. 6-8. For additional information, call or write the U. S. Department of Labor, Bureau of Apprenticeship and Training office in your area.

ASSOCIATED PRESS OFFICE HAS MOVED to 1300 Connecticut Ave., N. W., Washington, D. C. The move will end more than half a century of AP operations from the third floor of the Evening Star Building at 11th St. and Pennsylvania Ave., N.W. The new quarters at Connecticut Ave. and N St. are located on the first floor of the two-year-old International Association of Machinists Building.

FREE FILMS AVAILABLE: "PHOTO-REPRODUCTION" illustrates in detail how organizations large and small can boost efficiency and cut drafting costs by putting photo reproduction to work. This 23-minute color movie may be borrowed from: Graphic Reproduction Div., Eastman Kodak Co., Rochester 4, N. Y. "OUR COLORFUL CAPITAL" is a show of 150 Kodachrome 35 mm slides, recorded commentary and sound effects all illustrating the picture possibilities in Washington, D. C. Two separate sound tracks are supplied with the program: one, illustrating basic snapshooting tips or color picture-taking and the other, offering more advanced techniques. Request from: Audio-Visual Service, Eastman Kodak Co., Rochester 4, N. Y.

WESCON PAPER DEADLINE SET FOR MAY 1 Authors wishing to present papers at the 1959 Western Electronic Show and Convention technical sessions to be held in San Francisco August 18-21, must register their interest by May 1. Required are 100-200 word abstracts, together with complete texts or additional detailed summaries, which should be sent to the Chairman of the Technical Program: Dr. Karl R. Spangenberg, WESCON, 60 West 41st Avenue, San Mateo, California.

CALENDAR OF EVENTS:

MAY 4-6: This year's 11th Annual National Aeronautical Electronics Conference, which is jointly sponsored by the Professional Group on Aeronautical and Navigational Electronics and the Dayton Section of the IRE with participation by the Institute of Aeronautical Sciences, will feature "Electronic Systems in the Space Age." For further information write to: NAECON Housing Chairman, P. O. Box 621, Far Hills Branch, Dayton 19, Ohio.

MAY 4-8: The 85th Semi-Annual Convention of the Society of Motion Picture and Television Engineers will be held at the Fontainebleau Hotel, Miami, Fla. The convention theme, "Films and Television for International Communications," will be stressed in technical papers, demonstrations plus an International Equipment Exhibit.

MAY 5-7: The International Scientific Radio Union (URSI) Spring Meeting technical session will be held at the Willard Hotel, Washington, D. C. Cosponsors are the USA National Committee—URSI, and IRE Professional Groups on Antennas and Propagation, Circuit Theory, Information Theory, and Instrumentation.

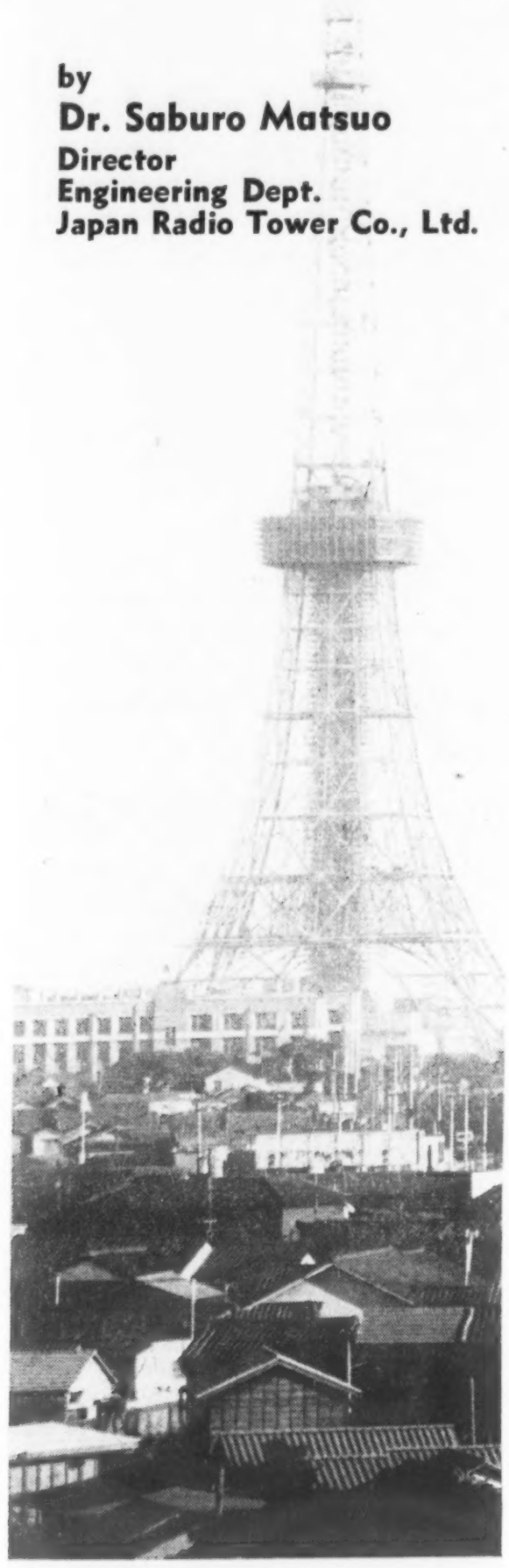
MAY 6-8: The 1959 Electronic Components Conference is to be held at the Benjamin Franklin Hotel, Philadelphia, Pa. and will be sponsored by IRE, EIA, AIEE and WCEMA. The convention theme is "New Concepts for the Space Age." The Philadelphia Biennial Electronic Material Conference, which is sponsored by the Philadelphia section of IRE with the University of Penna., has joined forces with the Electronic Components Conference.

MAY 11-13: The Radio Technical Commission for Marine Services Assembly Meeting will be held at the Mt. Royal Hotel in Montreal. At this joint meeting between Canadians and Americans the future of communications and navigations on the opening of the St. Lawrence Seaway will be reviewed. The highlight of the meeting is a field trip to inspect the Eisenhower Locks at Massena, New York.

MAY 21-27: The International Convention and Exhibition on Transistors and Associated Semiconductor Devices will take place at Earls Court, London, England. The event is sponsored by the Electronics and Communications Section of the IEE. All the major industrial countries will be represented, including the USA and the U.S.S.R. Approximately 200 technical papers will be presented.

the tokyo tower

by
Dr. Saburo Matsuo
Director
Engineering Dept.
Japan Radio Tower Co., Ltd.



Pacific Stars and Stripes Photo

Quote by AFCEA Tokyo Chapter President, Captain Frank Dingfelder, USN: "This Tokyo Tower is an indication of future accomplishment, rather than a monument to the past, such as the pyramids of Egypt or the Taj Mahal of India."

IN THIS Shiba Park, Tokyo, the world's highest self-supporting tower, a 333 meter high radio tower, has been erected. And often I have been asked the following questions: "For what purpose did you construct the Tokyo Tower?" "What is the need for constructing it?" "Why did you select Shiba Park for the site of the construction?"

In order to answer all of these questions and others, first I must state the purpose of the construction of the Tower.

As is well known, there have been three television stations operating in Tokyo for three years; namely, NHK, KRTV and NTV Stations. Furthermore, last December, three additional TV stations were granted a temporary license by the Postal Ministry. They are Educational TV, Fuji TV and NHK Educational TV Stations.

The purpose of the Tokyo Tower is to consolidate the antennas of all these six TV stations and establish their television transmitting facilities collectively and economically. Each transmitter now installed in the Tokyo Tower has the capacity of 50 KW output power and therefore, by use of this Tower, the service area of these TV stations can be expanded from the conventional 70 km radius to 100 km radius, and as a result, an additional 1,100,000 homes can be brought within the new service area. In other words, the residents over the whole district of Kanto now will be able to enjoy programs originating in Tokyo with their ordinary TV receivers. The Tokyo Tower is also prepared with facilities for FM broadcasting which is expected to start probably this year. Eight to ten FM broadcast stations are expected to be approved for the Tokyo area. Plans have been made for these stations to share one common antenna whereby construction and operating costs of the antennas may be reduced to a minimum. In addition, there are still other plans, and some construction work has already started to establish facilities for VHF mobile radio systems of the Japan Telegraph and Telephone Corporation, the Headquarters of the National Rural Police, the Fire Defense Agency, newspapers, broadcast stations, etc. All in all, the number of radio wave channels to be handled by the Tokyo Tower will reach several scores and it literally will appear to be an apartment house for all kinds of antennas.

Another purpose of the construction of the radio tower is for sightseeing. The observation platform which is 120 meters high above the ground is a two-story structure and has a total floor space of 400 tsubo or 14,400 square-feet. It is planne to accommodate an average of 10,00 sightseeing visitors per day.

A modern Science Hall having floor space of 6,400 tsubo or 230,40 square-feet is built between the leg of the tower, and exhibits of scientifi engineering especially in the field o electronics will be held in this build ing. We hope that we may do activ public relations work on scientifi engineering by showing the exhibit in the hall to the visitors to the Toky Tower.

Highest Self-Supporting Tower

The Tokyo Tower is the highes self-supporting tower in the world It is built 333 meters high above the ground and the ground is 18 meters above the sea level. There are two observation platforms; one is at the level of 120 meters above the ground and the other 225 meters above the ground. These are the lower and the upper observation platforms, the former being a two-story structure and having a floor space of 430 tsubo or 15,400 square-feet. The latter is a one-story open observation platform having a floor space of 37 tsubo or 1,332 square-feet. To the lower observation platform, an elevator with a capacity of 23 passengers will be operated and it can carry a total of 15,000 visitors per day.

Between the upper and the lower observation platforms, a ten-passenger elevator will be operated. At the beginning, the upper observation platform will not be used for sightseeing, but mainly for testing of antennas.

On the lower observation platform, thirty binoculars will be installed for sightseeing as well as for possible explanation of sceneries with the recording system. Besides telescopes, radars for centimeter waves and millimeter waves will be installed. The former radar will enable us to see on a cathode ray tube at a glance the scenery of the 50 km radius of the Kanto district with the center in southern Tokyo. The latter will enable viewers to enjoy the detailed picture of the 5 km radius around the Tokyo Tower, on a cathode ray tube. Tram cars and automobiles running in the Ginza and Shimbashi areas can be seen very close at hand. On the lower observation platform, a nocturvision will be set up, which will enable us to see scenes in the two to three km radium of the Tokyo Tower at night, even in pitch darkness as if we were peering through the telescope.

On the top part of the steel tower, an eighty meter long television antenna is installed. The NHK antenna is

placed on the highest part of the tower. This antenna is what is known as the turn-style antenna which adapts the double power-supply system for the first time in the world. The double power supply system is a system whereby the signals for two stations can be transmitted from one antenna. This antenna transmits signals for channel 1 and channel 3 of NHK simultaneously.

Below the NHK antenna, there are installed the antennas for the Educational TV (channel 10), the Fuji TV (channel 8), Radio Tokyo TV (channel 6) stations and one spare channel 4. All these antennas are of high gain type.

Around the elevator shaft between the upper and the lower observation platforms there will be installed the antennas for FM broadcasting. It is so designed that one antenna will be able to transmit the signals for eight broadcast stations. Around the outside of the steel tower, the antennas for VHF communications will be installed for use by the Japan Telegraph and Telephone Corporation, the National Rural Police, the Fire Defense Agency and newspapers as their mobile communication systems.

A modern Science Hall having a floor space of 6400 tsubo or 230,400 square-feet has been built between the legs of the tower. It has five stories above the ground and one basement, of which the fifth, fourth and third floors will be used as the space for exhibits of the modern Science Hall. On the fifth floor, also, there will be the TV transmitting equipment rooms of NHK, Educational, Fuji and Radio Tokyo TV stations. The room for the transmitting equipment for FM broadcasting is also provided on this floor. The fourth floor is to be called the Communications Broadcasting Hall where the exhibits of most recent engineering techniques will be presented by the Japan Telegraph and Telephone Corporation, and such telecommunication equipment manufacturers as Nippon Electric, Fuji Tsushinki, Oki Electric, Toshiba, Sumitomo Denko, Furukawa Denko, and broadcasting stations such as Nippon Hoso, Bunka Hoso, Radio Tokyo and Tokyo Electric Power Company. The third floor will be the General Exhibit Hall where top class electric equipment manufacturers such as Mitsubishi, Hitachi, National, Sanyo as well as leading companies in metal, steel and chemistry will have their exhibits. Altogether, as many as forty companies will set up their exhibits which will cover the third, fourth and fifth floors in the Science Hall and thus provide the visitors with one large hall for the public display of modern scientific engineering.

A Construction Record

The construction of the Tokyo Tower started in July 1957 and was completed on December 23rd, 1958, after a construction period of one and a half years. Comparing this with the Eiffel Tower in Paris which required 3 years for completion, we might say that this tower was completed within an amazingly short space of time. Especially in the case of the Tokyo Tower, it can be said that the construction was made doubly difficult because the Science Hall is built between the legs of the tower (whereas the Eiffel Tower does not have such a hall). This factor necessitated double dimensional construction methods for the tower and the building.

The steel material used is 3,600 tons as compared with 7,000 tons for the Eiffel Tower. In other words, with half of the steel material required for the Eiffel Tower, a tower which is higher than the latter by 13 meters was built. This clearly indicates that not only the improvement in the quality of the steel used but also long experience and precious information in designing the body of towers have invaluably contributed to the construction of this tower. Unlike France where the Eiffel Tower is built, Japan is also noted for earthquakes and typhoons. The fact that we have overcome these difficult conditions and established something that is the best in the world should be regarded as a victory for Japanese industrial engineering. From the designing to the construction, it is a pure product of Japan, built entirely by Japanese using only Japanese materials.

The Tokyo Tower was completed with an ensemble of the most unique techniques in the world such as the deep foundation engineering method, the high tension steel of the super gain tower, steel erecting techniques by use of erecters and derricks and the double power supply system for turn-style antennas. Such a great project as this can never be expected to be completed by the efforts of one or two individuals, but as the result of the endeavors of more than a hundred thousand people who were connected with the construction of the Tokyo Tower.

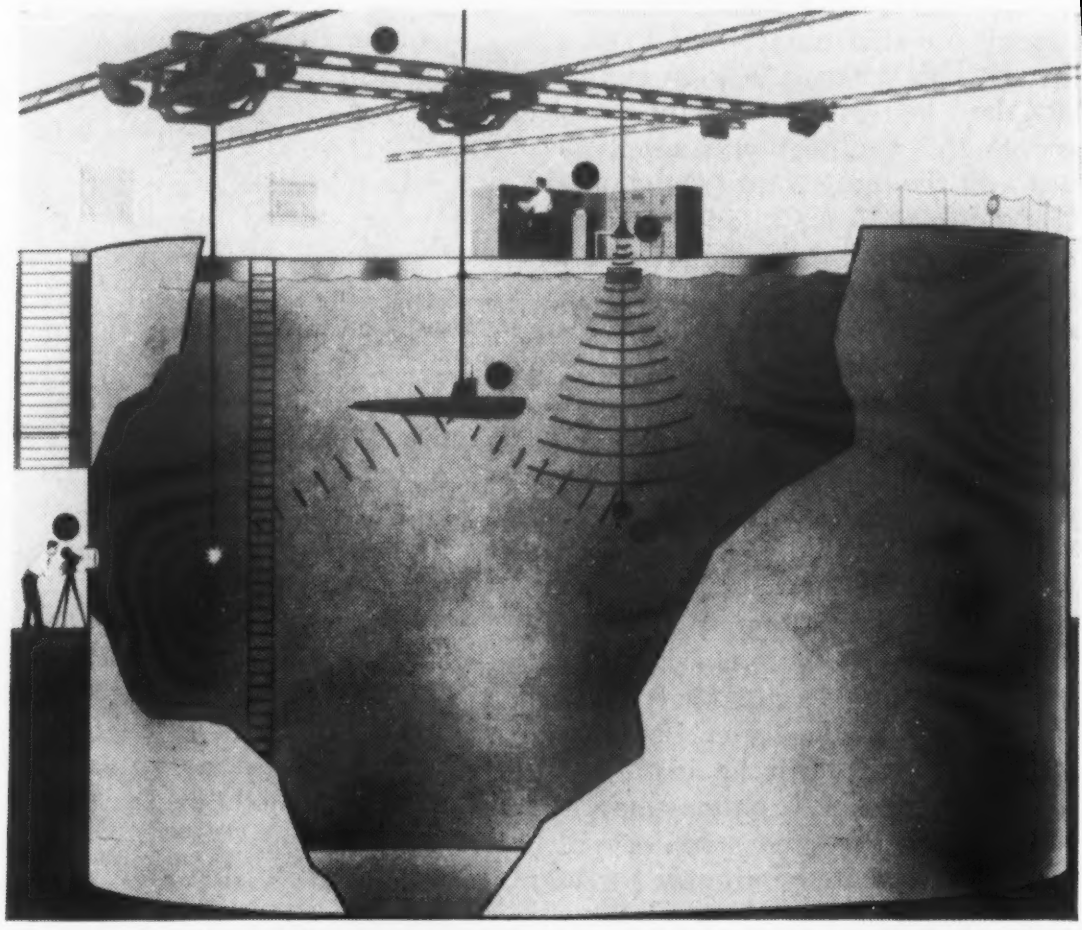
The Nikken Design Engineering Co. and the Takenaka Komuten Co. were connected with this project and their subcontractors were Matsuo Bridge Works Co., Shin-Mitsubishi Heavy Industry Co., Takuchi Construction Co. Companies responsible for installation of facilities were Tokyo Electrical Civil Engineering Co., Takasago Netsugaku Industry Co., Shinryo Reinetsu Co., Nishihara Eisei Co., Mitsubishi Electric Manufacturing Co., and others.

Dr. Saburo Matsuo, Director of the recently completed Tokyo TV Tower, addresses the AFCEA Tokyo Chapter during their recent quarterly meeting held at the Tower. Dignitaries attending the meeting included Captain Frank A. Dingfelder, U.S.N. (Right), President of the Tokyo AFCEA Chapter and Rear Admiral Frederick S. Withington, U.S.N. (Left), Commander Naval Forces, Japan.

hunting by

SONAR

signal staff report



Diagrammatic representation of new indoor sonar test tank at General Dynamics Corporation's Stromberg-Carlson Division, showing main features of 400,000-gallon tank and equipment. The tank is 48 feet in diameter and 30 feet deep. 1) Model submarine serving as "target;" 2) Underwater spark providing broadband sound source for echo ranging; 3) Hydrophone receiving echo from submarine; 4) Loudspeaker above water, for tests on transmission of sound from air into water; 5) Control and instrument racks; 6) Fastax camera for high speed photos of underwater phenomena; 7) Overhead tramways and positioning devices for support and placement of underwater equipment.

A DEMONSTRATION of submarine-hunting by sonar (SOund NAvigation Ranging) marked the opening of the nation's largest indoor underwater acoustic test facility at General Dynamics Corporation's Stromberg-Carlson Division at Rochester, New York on February 17th.

As high-ranking Navy personnel and General Dynamics executives attending the Anti-Submarine Warfare Conference listened and watched, sound was transmitted underwater and the echo from a model submarine was recorded. The full advantages of the uniformity and stability of the indoor facility, in contrast to the instability of open-water measurements, were emphasized by this fully-instrumented demonstration.

Rear Admiral John S. Thach, U. S. Navy, Commander Anti-Submarine Defense Group, ALFA, dedicated the new sonar facility by pouring into the tank a bottle of Arctic water collected by the atomic submarine *Seawolf* when it made its historic trip under the North Pole.

"The new sonar tank, measuring 48 feet in diameter and 30 feet in depth, with a capacity of more than 400,000 gallons will play an important role in developing defenses against the deep-running nuclear submarine, Lawrence B. Richardson, Senior Vice President—Engineering of General Dynamics, told the conference.

"We of General Dynamics," he said, "have a special appreciation of this danger because our Electric Boat Division is pioneering in the design and construction of deep running quiet subs. But, by the same token, we are convinced that our intimate knowledge of this new weapon gives us an advantage in finding a defense for it."

The underwater acoustic facility is equipped to carry out basic research in sonar and to study new techniques for detecting the quiet nuclear submarines.

The size of the tank accommodates the longer wavelengths which have come into use since World War II. The instrumentation also is unusually complete, providing maximum flexibility and utilization. It includes among other devices a seven-channel tape recorder-reproducer, an automatic sweep frequency transmission measuring set, a constant bandwidth analyzer, a proportional band analyzer, memory oscilloscopes, a high speed camera and a variety of transducers.

A port for viewing and photographing underwater phenomena (underwater lighting is provided) is available at the 15-foot level, the midpoint of the side of the tank. Also provided is transducer positioning equipment with a capacity of 5,000 pounds. With the open top on the tank, the placement of targets and transducers is unrestricted.

Among the acoustic studies being planned in the laboratory will be a series on the transmission of airborne sound into water. This is important in such activities as the towing of dunked sonar by helicopter, the sound of which could be picked up by a submerged hydrophone.

Following the example set by the Navy, as characterized by Admiral Thach's Defense Group ALFA, Mr. Richardson said, "General Dynamics is approaching the anti-submarine warfare problem from an over-all weapons system basis."

Dynamics President Frank Pace, Jr., in 1957 appointed a General Dynamics ASW Committee (Anti-Submarine Warfare), comprising top-level executives, to render assistance to the corporate division in comprehensive planning for future ASW equipment, to coordinate ASW system activities throughout the corporation, and to stimulate interdivisional flow of ideas on anti-submarine warfare systems and subsystems.

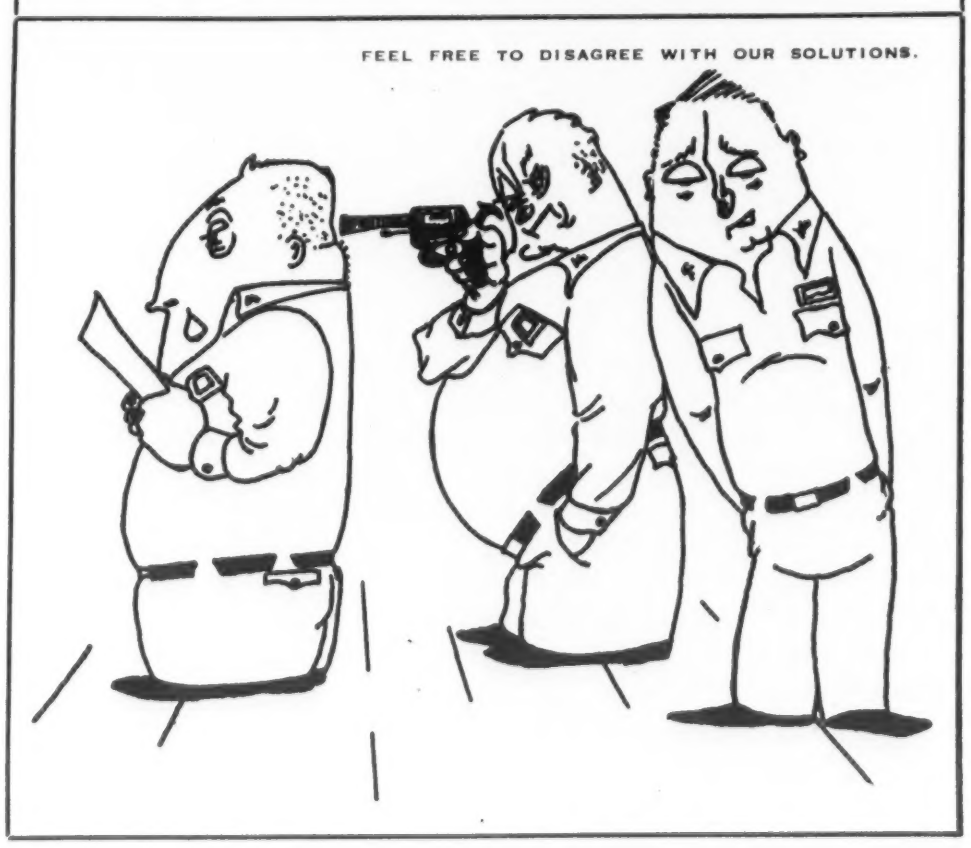
Stromberg-Carlson's new sonar test facility implements one of the early recommendations of this committee and will be a key part of the whole Dynamics ASW program. Three divisions of the corporation, Stromberg-Carlson, Electric Boat and Convair, and Dynamics's Canadian subsidiary, Canadair, Ltd., already are deeply involved in ASW work.

At Stromberg-Carlson, high-powered low-frequency, moving coil underwater transducers have been produced in pilot lots for a classified sonar system. In the less conventional transducer field, extensive company-sponsored developments have been carried out on an underwater spark source of sound. This spark promises to be very useful where a lightweight, repeatable and controllable wideband sound source is required. Work is being conducted in development of the hydrodynamic oscillator for systems requiring a non-electronic high-powered sound source.

Stromberg-Carlson is also building an airborne radio receiver which will be an important unit in new sonobuoy systems, including shipborne mine-hunting sonar, research in non-acoustic detection, underwater target classification, ASW mission of nuclear-powered seaplanes and ASW communications.

the nurturing of the late-blooming logistician

WHERE DID WE PUT THAT SPLIT-PHASE CONNECTOR ADAPTER RING JOINT M3?



FEEL FREE TO DISAGREE WITH OUR SOLUTIONS.

by
Col. Bernard S. Waterman
(Artillery) Commandant,
USA Logistics Management
Center, Fort Lee, Va.

LOGISTICS duty and the necessary educational preparation for performing it have recently begun to receive a lot of long-merited attention throughout the Army. The suspicion persists that we are not doing a thorough enough job of nurturing logisticians.

The standard Army educational system has, in the past, provided logistics education for its officers in several ways. The branch schools make it a practice to present the logistical aspects of the map exercises and tactical problems which they conduct, just as they present all of the other functions pertaining to the proper solution of these problems. This kind of education is aimed at developing officers who will be well-rounded commanders, able to give intelligent consideration to all aspects of their problems. The Technical Service schools, in their basic, company and advanced courses, come to somewhat closer grips with the problems of logistics. Their considerations are generally at the level of field units and directed specifically toward the functions of the individual Technical Services.

The Command and General Staff College considers the logistical aspects of the operations of larger combat units and so does the Army War College. Nowhere in the school system, except at the level of the Industrial College of the Armed Forces, has there been a direct attack on the broad problems of wholesale or producer logistics. Even the Industrial College of the Armed Forces has been constrained to a brief and hasty look at these problems within the broader context of economic mobilization as a whole. Only about 40 senior Army officers per year have had the good fortune to be exposed to this education.

This hastily drawn picture of logistics education represents the situation in the Army prior to 1954. The entire field of Department-of-the-Army-level logistics had been pretty well overlooked in educational planning. The school system did not provide any intensive preparation which would develop in an officer the ability to understand logistics on the wholesale or producer level or to comprehend the problems inherent in the over-all policy direction of a supply system carried on by seven different Technical Service Chiefs. Furthermore, the approach to logistics education at the combat arms service schools, the Command and General Staff College and the Army War College emphasized the development of "generalist" skills in the handling of all aspects of military operations. This somewhat ignored the existing fact that a great many combat arms officers frequently find themselves in assignments where they must understand high-level logistical problems and make policy decisions concerning major logistical operations.

The battle of the generalist versus the specialist has been going on for a long time. At opposite extremes, we have the specialist who learns more and more about less and less until he knows all about nothing, and the generalist who learns less and less about more and more until he knows nothing about everything. It is probably safe to say that this battle will never reach ultimate settlement. It is highly desirable to have competent generalists who can direct the work of others and lead the organization toward effective results. Those "others," the specialists, must be on hand if the generalists are to have anyone to direct. Otherwise, we reach the *reductio ad absurdum* of "Plenty Chiefs, no Indians." Anyway, the terms "generalist" and "specialist" are merely measures of degree rather than absolutes. We often hear senior logisticians referred to as specialists, but any executive in the business world who has the breadth and variety of knowledge required of a senior logistician will be regarded as the ultimate in generalists.

For many years, it was the common practice to assign

officers to senior logistical positions more or less at random. A well-rounded officer who had received full benefit of the Army's educational system was presumed to be capable of occupying any type of command position or any of the G slots appropriate to his rank. An officer might well find himself in a G-4 (Supply-logistics) billet on one tour and a G-3 (operations) billet on his next staff assignment. Senior officers with no prior service in logistical assignments were frequently assigned as commanders of major logistical commands of the United States Army. This is not to say that we did not get a pretty good performance from these highly capable officers. Still, we could undeniably do a better job of preparing a man to hold a major logistical command or to be a logistics staff of a major organizational element of the Army if his career development gives a little more emphasis to logistics than to the other staff functions. (See sketch top of page 35)

It was because of this evident lack of educational opportunity in higher level logistics, and the absence of concentration on the development of logisticians, that General Williston B. Palmer, then G-4 of the Army, decided in 1953, that steps must be taken to establish a new type of educational activity, focused on the skills and the technical knowledge of logistics management. He arranged a contract with a business educational consulting firm known as Harbridge House to develop an Army Supply Management Course. In the process of studying the need for this course and determining what form it should take, the responsible officers in General Palmer's office soon discovered that in addition to the absence of specialized supply education for senior officers another great gap existed. Thousands of civilians hold executive positions of varying degrees of responsibility in the Army supply system. Virtually nothing was being done to provide these civilians with the education and development to insure their competence to perform their jobs and to advance to more responsible ones. Thus, the new Army Supply Management Course took on some highly important new facets.

As a result of the Harbridge House proposals, General Palmer approved a course modeled on the advanced management programs conducted by numerous universities. The case method of instruction, developed by Harvard Business School and now increasingly used in other graduate programs, seemed to be the most promising of effective and lasting educational results among mature adults. Harbridge House therefore began the development of case materials based on situations within the Army supply system.

The Army Supply Management Course was launched in October 1954 at Fort Lee, Virginia, with Colonel (now Brigadier General) Thomas B. Evans as its Director. Harbridge House personnel taught the first class. The student body consisted of the military instructors who were to take over responsibility for the course and observers from Department of the Army agencies—a total of 34 students. The course has operated with only the briefest pauses since that date. In four years, it has been presented 16 times. Student bodies have increased steadily.

The course has not restricted itself to pouring out a steady stream of qualified logistics executives for the United States Army. Officers from 15 allied countries have attended the course. Each allied representative has stayed on after the course and has received the assistance of the faculty in developing a package of course material to start an Army Supply Management Course in his own country. Today, supply management courses flourish in Korea, Japan, the Philippines, Taiwan and Thailand. Officers from Pakistan, Iran, Turkey, Germany, Greece, Australia and Spain have gone forth armed with materials to start courses in their countries. The cur class has representatives from Canada, Norway and V Nam.

The Deputy Chief of Staff for Logistics, successor G-4, took another giant step in 1955, toward insur more emphasis on preparation for logistics duty. W the establishment of the Logistics Officer Program, created a nucleus of officers who would henceforth recognized as having a special interest in logistics, a who would receive assignments to logistics jobs alterna ing with basic branch assignments. This is a progra carefully tailored to the Army's needs. A study logistics jobs throughout the Army revealed approx mately 200 billets which should be classified as ke logistics positions. In order to provide for periodi rotation back to branch material assignments, there mus be two qualified logisticians for each such position. Th Deputy Chief of Staff for Logistics therefore set a goal o 400 logisticians. These fully qualified logisticians are normally colonels with over 20 years service. To insure a continuing inflow of younger officers to replace those retiring or being promoted, the program includes 600 younger officers of field grade. These are classified as logistics officers. As rapidly controlled assignments and education qualify them, they will be redesignated as logisticians to replace out-going older officers. The Deputy Chief of Staff for Logistics makes it his concern to select officers for his own key positions from among these logisticians and to recommended officers to major commanders to fill their key logistics positions.

Since the establishment of the Logistic Officer Program a companion career program for civilian employees has been instituted.

This careful control of assignments, together with the new supply management education, will go a long way toward guaranteeing a much higher level of professional logistics competence.

After the Army Supply Management Course had been in operation a little over a year, it became evident that still another field needed plowing. The Army Supply Management Course is limited by regulation to colonels, lieutenant colonels and civilians of grade GS-11 and above. A large number of people occupy positions in the supply management system which are best described as "middle management." These people have executive responsibilities too, and it became evident that they should receive some education for their tasks. The Army Supply Management Course covers all of the functions of supply—requirements, procurement, distribution, maintenance and property disposal. It appeared that the way to get at the needs of these more junior management personnel was to present a series of "functional" courses —one course in each of the functions of supply management.

The Deputy Chief of Staff for Logistics, General Magruder, directed the expansion of the Army Supply Management Course into a U. S. Army Logistics Management Center which would teach these additional courses. Harbridge House once more entered the picture and began the development of courses in Requirements Management, Distribution Management and Maintenance Management. Courses in Procurement and Property Disposal were already in operation at the Quartermaster School, and arrangements were made to transfer the responsibility for these courses to the new U. S. Army Logistics Management Center. Brigadier General Irvin L. Allen was designated the Commandant of the new Center and presided over the expansion of its functions.

The first functional course, the Procurement Management Course, began its operations in August 1956, under

the direction of Lt. Colonel H. F. Jenks, QMC, with a class of 42 people. It was followed in October 1956 by the Property Disposal Management Course with a class of 26 people. The Requirements Management, Distribution Management and Maintenance Management Courses sprang into being successively as Harbridge House completed their curricula, and by May 1957 the full program of the Center was in operation.

As the new expanded program swung into action, it naturally occurred to the Deputy Chief of Staff for Logistics and the Commandant that the educational program could reach more people if extension courses paralleling the resident courses were developed. Thus the Center began, in late 1956, the development of a Non-Resident Division which would write and administer these courses. Today, the Center offers courses in Introduction to Supply Management and all of the functional areas. Enrollment is inching steadily upward, and 1,300 correspondence students all over the world are now entered in this program. The Non-Resident Division also lends a hand in Reserve training and on-the-job training field logistics agencies, by providing instructional materials and guidance for class sessions.

Every forward-looking military man is doing his best to guard against being prepared to fight with World War II methods if World War III comes along. This concern led inevitably to recognition of the need for a logistics research and doctrine activity as a companion piece to the educational efforts of the Center. In November 1957, the Center received authority to establish such an activity. Since that time, nine senior officers with wide logistics background have reported for duty with the Logistics Research and Doctrine Department of the Center. Intensive work has begun on projects directed by the Deputy Chief of Staff for Logistics.

USALMC's approach to the education of supply managers differs in some respects from the traditional one found at most Army schools. The emphasis in instruction is not on solutions to past problems, but on broadening understanding, so that each student will be capable of coping with future ones. The case method of instruction lends itself well to this approach. The burden of problem solving rests on the students. By pointed questioning, the instructors prod the students toward better and more logical thinking and impel them toward better and more supportable solutions. The student carries away, not pat solutions prepared by the faculty, but the results of his own hard thinking. This method inevitably creates some frustrations. We have all been conditioned to the idea that instructors are there to give the answers, and the temptation to wait and hear the school solution rather than to think out one's own is overwhelming. But the USALMC student soon finds that if he won't do his own thinking, he will go away empty handed (or empty headed). Despite the frustrations which they feel as they undergo this experience, students come to recognize, after it is over, that they have acquired more knowledge through their discussions with their fellows than they could have absorbed merely by passive listening to alleged experts. They have received, in addition, a priceless treasure—the ability to think clearly and logically for themselves. (See sketch bottom of page 35)

In some quarters, management education has been labeled a "fad." This label implies that it is not here to stay. Those who so brand it seem to imply that management education is somehow different from other education. The Army's experience of the last half century belies these viewpoints. Let us recognize that "management" and "leadership" are synonymous terms. The Army adopted the use of the title "manager" from the business world when it began to interest itself in modern business methods of handling its non-combat activities. The manager in the business world is the leader—the person responsible for directing the activities of organizations.

The Army's entire system of officer education aims at the development of leaders—or managers, if you will. Throughout its recent history, the Army has sought to impart to its officers a balanced combination of technical knowledge and the skills applicable to the broad leadership or management tasks. Opinions differ as to whether the skills of management can be taught in the abstract—apart from application to some specific field of human activity. The U. S. Army Logistics Management Center does not concern itself with this philosophical debate. The crying necessity for people who know logistics, and who know also how to get logistics tasks accomplished through organizations composed of people, is so evident as to dictate the requirement for teaching management within the context of logistics skills. This effort is not vastly different from teaching management within the context of tactical skills, an activity which has been going on at Fort Leavenworth for some time.

How effective are the efforts of USALMC to develop logistics managers? The evaluation of the effectiveness of management courses has engaged the attention of many educators and psychologists, but no objective device for measurement has yet emerged. If a graduated student has been promoted to a higher grade or a bigger job, who is to say whether this is the result of his schooling, or of the natural ability which he possessed before he attended a course? Will a graduate really admit that he does not know any more after having completed a course than he did before? This would be an admission of immunity to exposure to knowledge. Are his bosses able to make objective judgments concerning whether he is an improved manager as a result of his attendance at a course? The infirmities of our efficiency reporting system have revealed fairly conclusively that bosses are not able to make very accurate judgments of the abilities of subordinates under any circumstances.

The Command and General Staff College has offered, as proof of its effectiveness, the success of its graduates in battle. Nobody would deny that they have demonstrated themselves to be very well equipped. But they were also acknowledged to be the Army's best officers before they went to Leavenworth. There never has been any comparable control group with similar amounts of service and occupying similar positions of responsibility with whom graduates could be compared, so that objective judgments might be made of the value of the Leavenworth course.

Thus, we do not have, and may never have, objective means of evaluating the effectiveness of the logistics management education which is offered by USALMC. Nevertheless, the feelings of numerous graduates, who say that they now have more assurance in the conduct of their responsibilities and more confidence in their ability to make decisions, are not to be regarded lightly.

The senior service colleges will undoubtedly continue to aim at the development of commanders who are capable of managing all aspects of the battle—and properly so. The Army will continue to rely on a mixture of these broadly trained officers and career civil servants to direct and conduct its high-level logistics business. This logistics business is going to get steadily more complicated as weapons and equipment increase in complexity. Congress and the public will continue to demand an even more skillful and scientific management performance. Under these circumstances, it is a safe bet that education in logistics management is here to stay.

AFCEA

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Association affairs

Special Awards Committee

An encouraging increase in chapter efforts to further interest in engineering and scientific education was discussed at a recent meeting of the National Executive Committee. As a result, the Committee authorized the appointment of a special awards committee to review chapter efforts during the 1958-59 fiscal year to stimulate interest in engineering and scientific education and to determine the chapter or chapters deserving of awards of commendation.

President F. R. Furth appointed the following National Directors as a committee to review chapter endeavors in this important field of activity: Chairman—Maj. Gen. Gordon A. Blake, Commander, USAF Security Service; George W. Bailey, Executive Secretary, IRE, and Percy G. Black, Vice President, General Telephone Service Corporation. Awards recommended by this committee will be presented at the annual banquet of the AFCEA National Convention on Thursday, June 4, 1959.

Chapter Scholarship

James J. Magill, President of the Dayton-Wright Chapter recently presented a check for $810 to Rodney J. Harrison, Director of Student Financial Aids and Scholarship at Ohio State University, to be used in sponsoring a three year scholarship for an electronics engineering student at Ohio State.

The scholarship committee is composed of Paul Clark, chairman, R. Neal Breesman, Harold Hollister and Herbert E. Johnson, Jr.

New Group Members

General Electric Company, Defense Systems Department

The Defense Systems Department of General Electric Company of Syracuse, N. Y., has become a group member of AFCEA. This GE department conducts program management of weapon systems, support systems and programming. Currently, they are working on an advanced study for the first-phase development of the Dyna-Soar project.

The company representatives to AFCEA will be: W. B. Booth, Manager, Employee Relations Operations; R. D. Featherstone, Manager, Finance; A. A. Fickel, Manager, Special Programs; D. L. Johnson, Manager, Manufacturing Operation; R. C. Raymond, Manager, Technical Military Planning; J. K. Records, Manager, Guidance and Information Systems; R. L. Shetler, General Manager, Defense Systems Department; W. R. Sinback, Manager, Marketing Operation; C. D. Small, Manager, Washington District Office, and J. H. Baker, Manager, Marketing Operation.

Beiser Aviation Corporation

The Beiser Aviation Corporation, P. O. Box 598, Fort Huachuca, Arizona, has joined the AFCEA group membership. This company is active in the manufacture, overhauling and modification of aircraft and components, electrical equipment, communication equipment, and electronic equipment.

The company representatives in AFCEA will be: Frank D. Beiser, President; R. K. Davis, Vice President and Secretary; J. M. Fraccaro, Assistant Secretary; G. R. Matthews, Vice President; C. D. Wilson, Superintendent A/C Maintenance; P. O. Kaylor, Superintendent Supply; E. R. Kelly, Assistant Comptroller; M. H. Gent, Personnel Manager; V. E. Patrick, Foreman and D. L. Chery, Materiel Control Chief.

Litton Industries, Inc.

Litton Industries, Inc., a manufacturer of digital computers and controls, microwave power tubes and precision components and transformers, has joined the AFCEA group membership. Their address is 336 N. Foothill Road, Beverly Hills, Calif.

The following officials will be full members under the group membership: W. P. Corderman, Vice President; H. E. Singleton, Vice President and General Manager, Electronic Equipments Div.; B. A. Worcester, Manager, Marketing Dept. Electronic Equipments Div.; R. W. McFall, Vice President and General Manager, Maryland Div.; G. Tinker, Manager, Sales, Maryland Div.; H. J. Gray, Manager, U. S. Engineering; R. E. Warn, Vice President and General Manager, Westrex; A. L. Buck, Manager, Washington office; S. G. Whittelsey, Jr., Manager, Dayton office, and R. White, Manager, Sales, Electron Tube Div.

Varian Associates

Varian Associates, a leader in klystron development, is a new group member. The company is located at 611 Hansen Way, Palo Alto, Calif.

Varian representatives to AFCEA will be: H. M. Stearns, President; F. E. Stoner, Assistant to the President; E. G. Cameron, Vice President and General Manager; D. A. Rutledge, Director of Personnel and Public Relations; W. M. Silhavy, Sales Manager, Tube Division; F. D. Wilimek, Contract Administrator, and G. W. Carnahan, Technical Assistant to the President.

NEW MEMBERS

Listed below are new members of the AFCEA who have joined the Association during the month of February. Members are listed under the Chapter with which they are affiliated. The March listing will appear in the May issue.

ARIZONA
Lt. Col. Myron P. Smith
R. K. Davis
J. M. Fraccaro
G. R. Matthews
C. D. Wilson
P. O. Kaylor
E. R. Kelly
M. H. Gent
V. E. Patrick
D. L. Chery
H. William Welch, Jr.

ATLANTA
George W. Griffith
Charles G. Johnson
Delmont E. Beckemeyer
James A. Ingman, Jr.
Melvin H. Mooney, Jr.
Thomas J. Malcolm
T. Sudderth, Jr.
Patrick J. McCaffrey
Cyrus M. Kitchens

AUGUSTA-FORT GORDON
Lt. Col. Edward C. Kelton
Lt. Col. W. H. Sheard
Lt. Col. Hamilton T. Crowell
Maj. Norman B. Carr
Capt. Allen C. Breaux
Capt. Edwin R. Tobias
Capt. William R. Staak
Maj. Cornelius Zwart
1st Lt. Lewis Jolly, Jr.

BOSTON
Albert E. Mignone
Robert Lane

CHICAGO
Charles H. Newberry
Frank S. Kasper
Robert S. Melhorn
Robert C. Bickel
Robert P. Lamons
Henry F. Miller
Lawrence R. Krahe
Douglas E. Proctor
Edward J. Dwyer
William R. Dankert
Lois E. Kutz
Irene X. Lawlor
L. Cotuno
S. W. Tarnoff
George Zering

DAYTON
S-Sgt. R. Kent Ricker
1st Lt. Allen H. Rodes
S. G. Whittelsey, Jr.

DECATUR
Carl H. Garbe
Gordon Gates
Glen L. Mays
John W. Meyer
Kenneth Poole
Monroe Taylor
Kenneth Stalter
Garry Tolbert
Joseph W. Wiandt
Norman L. Houg
Robert B. Lyman

DETROIT
Robert Moore

FRANKFURT
Maj. James C. Prince

GULF COAST
Maj. Harold Gershon
Maj. Frank M. Deville, Jr.
Capt. Ernest S. Banks
John T. Wachs
1st Lt. Michael Rapko

HAWAII
Steve J. Walther
John B. Skewis
John B. Allison
Herbert T. Olivieri
Lawrence A. Julian
Howard R. Yannell
John Schleif

KANSAS CITY
Malcolm B. Magers

LONDON
T-Sgt. Roland L. Akerley

LOUISIANA
Bruce A. Wedemeyer
Robert L. Calhoun
Samuel Weinstein
Fred R. Adams
William J. Dearmas, Jr.
Clinton Perkins, Jr.

MONTGOMERY
Damon P. Dean

NEW YORK
James F. Burke, Jr.
Henry M. Edwards
Harold J. Detlefs
Kenneth J. Whalen
Edward J. Russell
Lt. JG. Kenneth W. Lydic
Sheldon Detwiler
Anthony Loscalzo
J. W. McRae
Leslie B. Haigh
R. Edward Warn
Donald K. Deneuf
Donald M. Spencer

NORTH CAROLINA
Fred B. Deem, Jr.

NORTHWEST FLORIDA
James T. Whitaker
George E. Bert Mead
Allen M. Priester
Paul S. Davis
Julius H. Foshee
Allen C. Hughes

PHILADELPHIA
G. C. Liacouras
G. Hoberg
E. M. Hartley
Lt. Col. Ronald Ransier

PITTSBURGH
Capt. Francis J. Kirsch

ROCKY MOUNTAIN
Robert S. Brinson
Roy E. Donegon

ROME-UTICA
Lt. Col. Alan V. Rochford
Otis C. MacFarlane
Maj. John B. Kelley
Harold W. Morse
John W. Worthington, Jr.

SAN DIEGO
R. E. Alderman

SAN FRANCISCO
Earl W. Baker
Roger White
Joseph R. Mensch
J. C. Inkster
Lt. Cdr. Harold E. DeLong
Robert H. Reeves

SCOTT-ST. LOUIS
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Maj. Cecil L. Harper
Maj. James E. Henderson
Cdr. Thomas W. Thrush
Maj. Paul E. Sizemore
Capt. William H. James
Kenneth W. Kirchhoff

SOUTHERN CALIFORNIA
Al Gardner
Frank Comer
Robert D. Nagle
Edward H. Ahlgren
L. L. Doling
J. F. Irwin
H. C. Chambers
Roger D. Swanson
Robert F. Blaine
Raimon L. Conlisk
Albert P. Albrecht
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Donald F. Creedman
Harry E. Carpenter, Jr.
James P. Hammond
George S. Turner
James P. Carbaugh
L. G. Becker
Lt. Cdr. Maynard F. Dunham
Russell W. McFall
A. Lester Buck
Clifford J. Leahy

NEW MEMBERS WITHOUT CHAPTER AFFILIATION
Richard A. Powell, Baldwinsville, N. Y.
J. W. Wright, Rochester, N. Y.
James H. Murphy, Tonawanda, N. Y.
Capt. Harry K. Neveu, Madison, Wisc.
Maj. Frank L. Ziegler, APO 94, S. F.
LCdr. Edward T. Pendleton, NAS-Navy 14, FPO S. F.

First Sustaining Member

At the Directors' Meeting on March 18, 1959, the Board authorized a sustaining membership for those companies who wished to so affiliate themselves with the AFCEA. The following day, the Cook Electric Co., formerly a group member with main offices in Chicago, notified National Headquarters of its desire to be the first sustaining member of the Association. AFCEA salutes Mr. Walter C. Hasselhorn, President, and the members of Cook Electric Co.

AFCEA Group Members

Communications—Electronics—Photography

Listed below are the firms who are group members of the Armed Forces Communications and Electronics Association. By their membership they indicate their readiness for their share in industry's part in national security.

Sustaining Member

Cook Electric Co.—Transferred from Group Member March 18, 1959. See page 39.

Acme-Danneman Co., Inc.
Admiral Corp.
Aircraft Radio Corp.
Allied Control Co., Inc.
Allied Radio Corp.
American Cable & Radio Corp.
American Institute of Electrical Engineers
American Machine & Foundry Co.
American Radio Relay League
American Telephone & Telegraph Co.
American Telephone & Telegraph Co., Long Lines Dept.
Ampex Corp.
Amphenol/Borg Electronics Corp.
Anaconda Wire & Cable Co.
Andrew Corp.
Arnold Engineering Co.
Atlas Film Corp.
Atlas Precision Products Co.
Automatic Electric Co.
Automatic Electric Sales Corp.
Automatic Telephone & Electric Co., Ltd.
Autonetics, Division of North American Aviation, Inc.
Barry Controls, Inc.
Beiser Aviation Corp.
Bell & Gossett Co.
Bell Telephone Company of Pa.
Bell Telephone Laboratories, Inc.
Bendix Radio Division, Bendix Aviation Corp.
Bliley Electric Co.
Bomac Laboratories, Inc.
British Thomson-Houston Co., Ltd.
Bruno-New York Industries Corp.
Burroughs Corp.
California Water & Telephone Co.
Cambridge Thermionic Corp.
Capitol Radio Engineering Institute, Inc.
Carolina Telephone & Telegraph Co.
Central Technical Institute
Chesapeake & Potomac Tel. Co.
Cincinnati & Suburban Bell Tel. Co.
Collins Radio Co.
Columbia Broadcasting System, Inc.
Contraves Italiana
Convair, Division of General Dynamics Corp.
Copperweld Steel Co.
Cornell-Dubilier Electric Corp.
A. C. Cossor Ltd.
Craig Systems, Inc.
Crosley Division-Avco Mfg. Corp.
Designers for Industry, Inc.
Diamond State Telephone Co.
Dictaphone Corp.
DuKane Corp.
Du Mont, Allen B., Laboratories, Inc.
Eastman Kodak Co.
Electronic Associates, Inc.
Electronic Communications, Inc.
Elgin Metalformers Corp.
Fairchild Camera & Instrument Corp.
Federal Telecommunication Laboratories
General Analysis Corp.
General Aniline & Film Corp.
General Communication Co.
General Electric Co.
General Electric Co., Defense Systems Dept.
General Telephone Corp.
Gilfillan Bros., Co.
Globe Wireless, Ltd.
Gray Manufacturing Co.
Hallamore Electronics Co.
Haller, Raymond and Brown, Inc.
Hallicrafters Co., The
Haloid Xerox Inc.
Hazeltine Electronics Division, Hazeltine Corp.
Heinemann Electric Co.
Hoffman Laboratories, Inc.
Hogan Laboratories, Inc.
William F. Hogan Associates, Inc.
Hughes Aircraft Co.
Illinois Bell Telephone Co.
Indiana Bell Telephone Co.
Indiana Steel & Wire Co.
Institute of Radio Engineers
International Business Machines
International Resistance Co.
International Telephone & Telegraph Corp.
International Telephone & Telegraph Laboratories
ITT Federal Division of International Telephone & Telegraph Corp.
Jacobsen Manufacturing Co.
Jansky & Bailey, Inc.
Jerrold Electronics Corp.
Kellogg Switchboard & Supply Co.
Kleinschmidt Laboratories, Inc.
Leich Sales Corp.
Lenkurt Electric Co.
Lewyt Manufacturing Corp.
Litton Industries, Inc.
Lockheed Aircraft Service, Inc.
Machlett Laboratories, Inc.
Magnavox Co.
Marconi's Wireless Telegraph Co. Ltd.
Materiel Telephonique Co.
Michigan Bell Telephone Co.
Montgomery Co., The
Motorola, Inc.
Mountain States Telephone & Telegraph Co.
Mullard Ltd.
Muter Co.
National Co., Inc.
Nelson Technical Enterprises, Inc.
Nems-Clarke Co., Div. of Vitro Corp. of America
New England Tel. & Tel. Co.
New Jersey Bell Telephone Co.
New York Telephone Co.
North Electric Co.
Northwestern Bell Telephone Co.
Oak Manufacturing Co.
Ohio Bell Telephone Co.
O'Keefe & Merritt Co.
Otis Elevator Co., Electronic Division
Pacific Mercury Television Mfg. Corp.
Pacific Telephone & Telegraph Co.
Packard-Bell Electronics Corp.
Page Communications Engineers, Inc.
Phelps Dodge Copper Products Corp.
Philco Corp.
Photographic Society of America
Plessey Co., Ltd.
Prodelin Inc.
Radiation, Inc.
Radio Corporation of America
Radio Corporation of America, Defense Electronic Products
RCA Great Britain, Ltd.
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Ramo-Wooldridge, Division of Thompson Ramo Wooldridge Inc.
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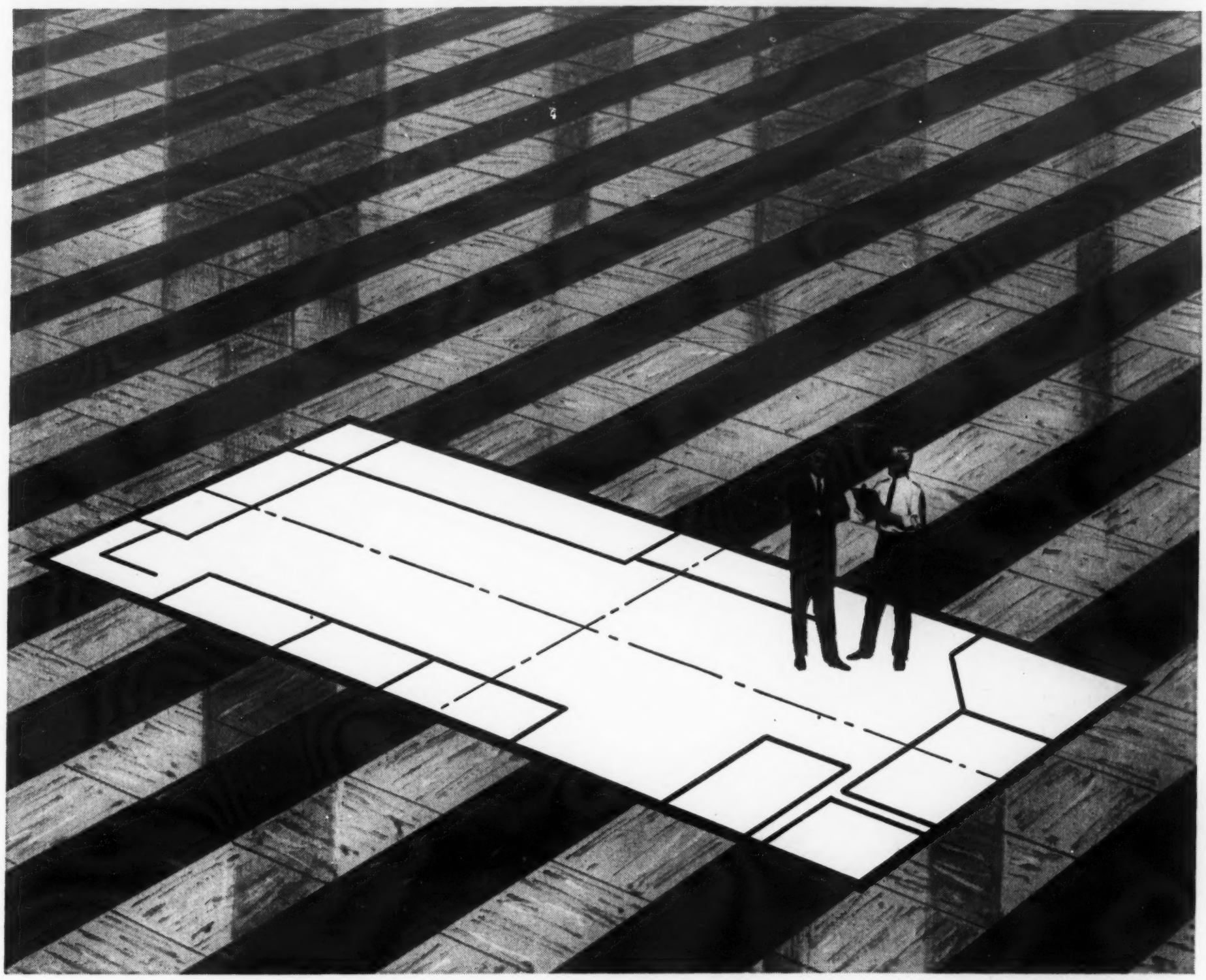

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Chapter News

Atlanta—A portion of the attendance at the chapter's January 21st dinner-meeting at the Fort McPherson Officers Club, at which Frank Morris, Director of Research for Stromberg-Carlson, was principal speaker. Program subject was "Electronics in the Present Modern Day Age."

Atlanta

Frank Morris, Director of Research for the Stromberg-Carlson Co., Rochester, N. Y., was the guest speaker at the January 21st meeting of the chapter at Fort McPherson Officers Club. "Electronics in the Present Modern Day Age" was the subject of Mr. Morris' talk which emphasized some of the important research developments being conducted by industry in electronic communications.

In the absence of Chapter President W. B. Bryan, Mr. A. E. Arnold, first vice president, presided over the meeting attended by 202 members and guests. Those sitting at the head table were: Burk Linder, Elmer Raburn, Vic Cain, S. J. Elliott, Don Glenn and Capt. N. A. Christensen, Ticket Committee; R. L. Janss, Invocation; Mel Butler, Chairman of Reception; Bill Burnett, Membership Chairman and Ticket Committee; Jane Radford, Anne McMichael, Dot Hunter and Ruby Terry, Hostesses.

Chicago

Some 200 AFCEA members of the Chicago chapter soared into space Jan. 29th on the words of Col. H. S. Newhall, Commandant of the U. S. Army Ordnance Guided Missile School, Redstone Arsenal.

Mr. A. D. Davis, President of the Allied Radio Corp., was host for the meeting. President Henry J. McDonald, Secretary and General Counsel of Kellogg Switchboard and Supply Co., called the meeting to order in the Allied cafeteria. He introduced several distinguished guests, one of whom was J. H. Kellogg, former president of the AFCEA Chicago chapter and now President of the Robertson Transformer Co., Blue Island, Ill.

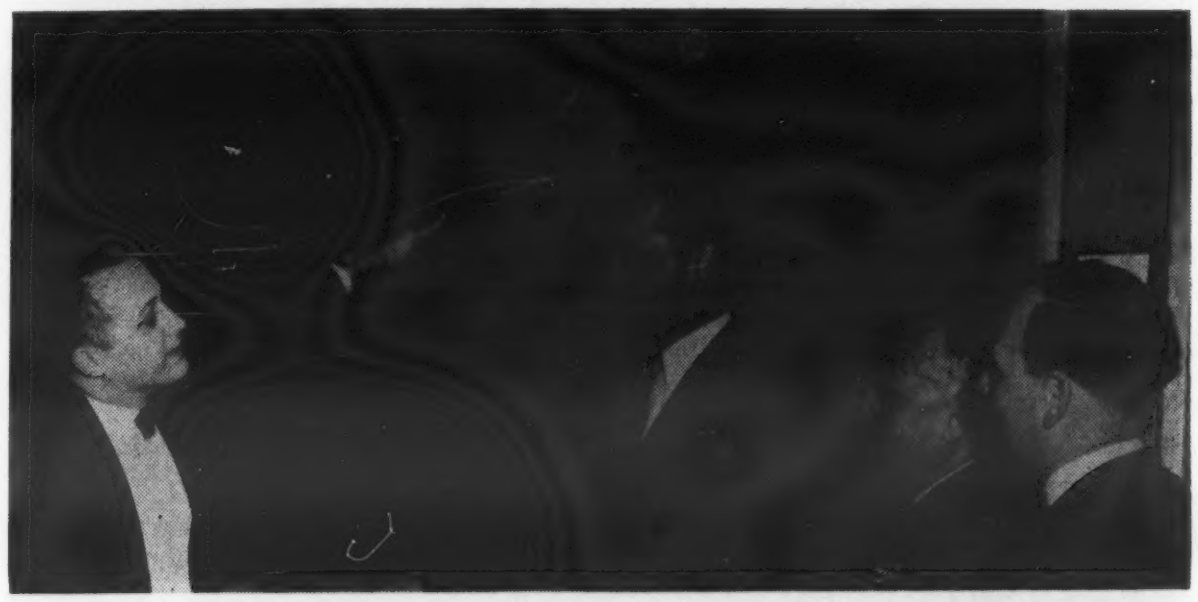
Col. Newhall, a veteran of 20 years Army service, employed slides and film to dramatize his talk on the "Role of the Ordnance Corps in the United States Army Guilded Missile Program." While running the gamut of the many missiles in the Army arsenal, from "Little John" to "Jupiter C," he painted a terrifying picture of their awesome destructive powers. As he described each missile and its capabilities, the screen portrayed an actual launching and flight.

After relating the history of the Guided Missile School and the vital role it plays in the missile training program, Col. Newhall implied that the lack of trained personnel retarded progress in the conquest of space. He said, "Our greatest single asset is manpower. There's a premium on trained electronics men, and the Armed Forces must vie with industry for their services."

In conclusion, he pointed out the three teams necessary to a successful missile program: 1) scientists for research and development, 2) industry to take their ideas and fashion them into necessary equipment, and 3) missile men—the personnel who launch and guide the space vehicles.

Eugene Carrington, Educational Director of Allied Radio Corp., utilized tape and discs to vividly demonstrate stereophonic sound. In his talk, Mr. Carrington pointed out the fallacy of the common belief that stereophonic sound permits one to pinpoint the source. He said, "selective listening is the greatest asset of stereophonic sound. For example: a listener can detect the various pieces in an orchestra without the louder instruments drowning out the sound."

Baltimore—Shown at the Marine Corps sponsored meeting held on January 15th, left to right: Col. Charles L. Cogswell, USMCR; Lt. Col. LeRoy Bald, Marine Corps Reserve Training Center; Chapter President Trevor H. Clark; Maj. Gen. Henry R. Paige, USMC, Asst. Chief of Staff G-4, who was the main speaker; Lt. Col. Henry Bourgeois, aide to Gen. Paige; and Brig. Gen. James P. S. Devereux, USMC (Ret.).



Boston—Pictured during the January meeting at the Boston Naval Shipyard are, left to right: Bruce McCaffery of Raytheon Manufacturing Co., who was the main speaker; Chapter President Robert B. Richmond; Col. Sidney S. Davis, PMS&T at Northeastern University; and Louis Dunham, of Franklin Technical Institute, chapter vice-president.

***Dayton-Wright**—Four past chapter presidents and the present one pose with Paul P. Roudakoff, guest speaker, after the February 19th dinner-meeting which took place at the Wright-Patterson AFB Officers Club. Left to right: Byron K. Boettcher, Harry C. Blackburn, Mr. Roudakoff, R. J. McIlrath, Paul Clark (AFCEA Regional Vice President), and James J. Magill, current chapter president.*

Dayton-Wright

"Changing Style in Ground Electronics Equipment" was the subject of the chart and film presentation by Brig. Gen. Donald P. Graul, Commander of the Rome Air Development Center, Griffis AFB, N. Y., at the Jan. 22nd dinner-meeting of the chapter. The meeting was held at the Officers Club at Wright-Patterson AFB, Ohio, with 100 members and guests present.

Paul Scally, program chairman, served as master of ceremonies. This was Paul's last meeting with Dayton Chapter before leaving for a new job in Philadelphia.

Special guests were Col. and Mrs. A. A. Denton. Col. Denton, past commander of Dayton AF Depot, left 1 February for a new assignment as Deputy Commander of San Antonio Air Material Area, San Antonio, Texas.

The new ballroom of the Wright-Patterson AFB Officers Club was crowded to overflowing to hear Paul P. Roudakoff, featured speaker at the February 19th meeting of the chapter. Mr. Roudakoff, a naturalized U. S. Citizen and the son of a former Maj. Gen. in the Russian Imperial Army, selected "Russia at the Crossroads" as his subject.

Mr. Roudakoff spoke on U.S.S.R. ideologies, the Russian propaganda machine, presentation of forces in the U.S.S.R., what happens to the young people in the U.S.S.R., what is beneath the surface, who is responsible for communism, and how solid are the Russians. He also spoke on the educational aspects of the Russian GIs in World War II and on what is happening to the people in the Soviet Zone.

Mr. Roudakoff has been decorated by three countries in addition to his many other accomplishments. He is presently a member of the Customer Relations Staff of RCA, Electron Tube Div., Harrison, N. J.

Special guests at this outstanding meeting were: Brig. Gen. and Mrs. C. E. June, new Commander at Dayton AF Depot and five past presidents of the chapter.

Decatur

Chapter members gathered at the Officers Mess at the Decatur Signal Depot for the January 27th meeting to elect new officers.

The following officers were elected: Lt. Col. Robert A. Starr, president; Jess Juarez, first vice president; Edward O. Beck, second vice president; Edward J. Maloney, secretary; Leo W. Ruedger, treasurer; Gene L. Emmons, Charles Roberts, Donald L. Agans and Andrew S. Chan, Board of Directors.

Fort Monmouth

"Accent on Sound," a non-technical talk and demonstration on problems in sound transmission over telephone networks and the improvements achieved over the years, was presented at the February 18th dinner-meeting of the Fort Monmouth AFCEA chapter.

The speaker, Michael E. McCabe, supervising lecturer for the New Jersey Bell Telephone Co., used electronic devices and tape recordings in his demonstration in the Sapphire Room of Gibbs Hall Officers Club. Mr. McCabe demonstrated the improvements obtained over the years through research, ranging from the sound range of the dull thud base note of an explosion to dog whistles you can't hear and on into the new and amazingly realistic stereophonic reproduction of sound.

Col. A. L. Burke of the Army Signal School, chapter president, presided at the short business session. A nominating committee headed by J. P. Hoffman, Fort Monmouth Information Officer, is selecting a new slate of officers for approval.

Gulf Coast-Louisiana

A joint meeting of the Gulf Coast and Louisiana chapter was held on February 18th. A tour of the Keesler Training School was attended by members of both chapters and two groups from electronics classes of Perkinston Junior College at Perkinston, Miss. in the afternoon.

Ancil Z. Arseneau, president of the Gulf Coast chapter, presided at the dinner-meeting at the Magnolia Room

***Fort Monmouth**—Twenty-four industries were represented among the more than 200 attending the February dinner-meeting at Gibbs Hall Officers Club. Pictured from left to right are: Ray Gilbarte, Admiral Corp.; Frank Langstroth, Philco Corp., and president of AFCEA's Philadelphia Chapter; Michael E. McCabe, guest speaker from New Jersey Bell Telephone Co.; Norman Freeman, Stromberg-Carlson; Brig. Gen. W. B. Larue, USA(Ret.), Melpar, Inc.; and Thomas King, Kellogg Switchboard and Supply Co.*

February 19th
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at the White House Hotel. Sixty members and guests were present. Messrs. W. A. Gillentine and Wes Massey, president and vice president of the Louisiana Chapter, respectively, were introduced to the group. Mr. Gillentine commented on the National Defense Resources Conference to be held in New Orleans 13 April through 24 April and invited all members to enroll. He presented copies of an article on "The History of the AFCEA" that appeared in the December issue of *Southern Telephone News* written by Mr. Ben S. Gilmer, President of Southern Bell.

A talk and demonstration of the Ballistic Missile was presented by Art Dennis, Warrant Officer with the Missile Training Center.

Lexington

Dr. Karl O. Lange, Director of the Wenner-Gren Aeronautical Research Laboratory at the University of Kentucky, was the guest speaker of the February 6 dinner-meeting held at the Thoroughbred Restaurant.

The new chapter officers were installed as follows: Raymond Soard, Jr., Chief Engineer of the General Telephone Co. of Kentucky, president; Lt. Col. Henry L. Morris, Lexington Signal Depot, executive vice president; Major Jarnest C. Chaplin, Lexington Signal Depot, vice president; Waddy Neubauer, Kentucky Supply Co., secretary, and Merrill Whitmer, Lexington Signal Depot, treasurer. Following the election of officers, Dr. Lange presented an interesting review of the history of missile development and answered questions of current interest.

Montgomery

The chapter held its regular monthly meeting on February 11th at the Maxwell Air Force Base Officers Club. Lt. Col. Herbert Herman of the Air Command and Staff College and president of the chapter, presided over the meeting and introduced Osie Burns, Transmission Supervisor in the Plant Department and Dan Strickland, Engineer of Southern Bell Telephone Co., who presented a lecture demonstration and film program entitled "Conquering the Sea." The program dealt with the undersea cable facilities constructed by the Bell System.

Among the out-of-town members present with their wives representing Southern Bell were H. B. Lackey, Assistant Vice President; J. W. Miller, General Personnel Manager, and S. W. Reese, Chief Engineer, all from Birmingham.

Montgomery—Shown at the head table at the February meeting, which featured a Bell System program, are, left to right: Mr. and Mrs. Harry B. Lackey, asst. vice president of Southern Bell Telephone Co., Birmingham; Mr. and Mrs. Madison M. DeShields, president of DeShields Shoes, Inc., Montgomery; Lt. Col. Herbert Herman, chapter president, and Mrs. Herman; Sidney W. Reese, chief engineer, Southern Bell, Birmingham, and Mrs. Reese.

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New York

Timothy Hartnett, Chief of Communications Section, Federal Aviation Agency, Idlewild International Airport, was the guest speaker at the January 28th dinner-meeting held at the Hotel Belmont Plaza. In his talk, Mr. Hartnett highlighted the history of the CAA and described the navigation, radar and communications facilities which have been integrated into the new FAA organization.

Chapter president, Henry R. Bang presented Col. Ludwig R. Engler, 1958 chapter president and 1959 member of the executive committee, with a miniature telegraph key and sounder engraved in recognition of Col. Engler's distinguished service to both the New York chapter and the communications industry.

Nearly 200 members and guests were on hand at the February 25th meeting to hear about Project SCORE (Signal Communications by Orbiting Relay Equipment). The speaker of the evening was Col. H. McD. Brown, Commanding Officer of the U. S. Army Signal Research and Development Laboratories at Fort Monmouth.

Col. Brown described the super crash job which was done by the Laboratories in providing communications equipment for the Atlas satellite which is now famous for relaying President Eisenhower's Christmas greetings to the world. Work was authorized for

New York—Project SCORE was the program feature of the chapter's February 25th dinner-meeting at the Hotel Belmont Plaza, attracting a record attendance. Pictured above are, left to right: Capt. Edgar S. Powers, USN, member of the chapter's Armed Forces Committee; Rear Adm. William H. Organ, USN(Ret.); Brig. Gen. Joseph E. Heinrich, AFCEA National Director; Col. Harold McD. Brown, Commanding Officer of the U. S. Army Signal Research and Development Laboratories at Fort Monmouth, guest speaker; Col. William E. Jennings, Signal Officer First Army and a Director of the New York Chapter; and Glenn D. Montgomery, AFCEA Regional Vice President.

this project on July 2, 1958, and all was in readiness for the launching of the satellite on December 18th. Col. Brown attributed much of the success of this super-secret project to the fine cooperation which was received from the Air Force's Ballistic Missile Division, Convair's Astronautics Division, Radio Corporation of America and the many companies in the electronic industry who helped in this project. The Laboratories, of course, maintained the prime over-all and systems responsibility which included the all-important job of packaging the equipment for outer space environment, its installation, testing and final operation.

Through the courtesy of the Laboratories, a large display was set up showing the components and the complete satellite package. Following Col. Brown's talk, Marshall Davis, one of the engineers who worked on the SCORE design, answered technical questions and explained the various components and subsystems on display.

The program on Project SCORE showed the future possibilities in the use of satellites as another medium of relaying communications in this age of electronic miracles. The communications and electronic industry may well feel proud of the work which the Signal Corps Laboratories at Fort Monmouth are doing to assist in our Nation's serious competition with the East on the space frontier.

Besides the guest of honor and Henry R. Bang, chapter president, others seated at the head table were: Adm. F. R. Furth, USN (Ret.), National President of AFCEA; Adm. William H. Organ, USN (Ret.); Col. William E. Jennings, Signal Officer First Army and a Director of the chapter; Capt. Edgar S. Powers, USN, member of the chapter's Armed Forces Committee; Allen E. Wharton, past president of the chapter; Glenn D. Montgomery, AFCEA Regional Vice President and a Director of the chapter; and Brig. Gen. Joseph E. Heinrich, USAR, a National Director of AFCEA.

Rocky Mountain

President Col. Howard S. Gee opened the January 28th noon meeting held in the Antlers Hotel. The featured speaker was Dr. Harry Woll, Manager of Development Engineering, Defense Electronic Products, RCA. Dr. Woll spoke on electronics with particular emphasis on current developments in parametric amplifiers, Masers and atomic clocks.

Guests included representatives of the Alexander Film Co. of Colorado Springs and the Clifton Precision Products Co.

San Francisco

At the chapter's annual closed meeting, which was held January 22nd at the Officers Club of the Presidio of San Francisco, a new slate of officers and directors was unanimously elected. The officers are as follows: president, James T. Chatterton, Mackay Radio & Tel. Co.; 1st vice president, Col. H. L. Schnoor, USA (Ret.), Pacific Tel. & Tel. Co.; 2nd vice president, Maj. Gen. A. L. Pachynski, USAF (Ret.), Lenkurt Electric Co.; secretary, C. V. N. Steffen, Pacific Tel. & Tel. Co. (re-elected); treasurer, J. F. Parachini, RCA Service Co., Inc. (re-elected); historian, Lt. Col. W. G. Damerow, USA (Ret.), Pacific Gas & Elec. Co., (re-elected); directors: (two year term) Col. L. C. Parsons, USA (Ret.); Col. H. L. Purkhiser, USA Sig. O. Hq. 6th Army (re-elected); F. Lee Sloan, F.C.C. (re-elected); C. L. Wickstrom, Pacific Tel. & Tel. Co., (re-elected); Capt. T. H. Templeton, USA (Ret.), Stanford Research Institute, and Maj. Gen. F. E. Stoner, USA (Ret.), Varian Associates.

The meeting, conducted by outgoing president T. D. Razovich, was attended by 62 members. After the business meeting, General Pachynski addressed the group and showed an Air Force film on SAGE.

San Francisco—Some of the officers elected at the January 22nd annual meeting are shown above. Front row, left to right: Col. H. L. Schnoor, USA(Ret.), Pacific T&T Co., 1st vice pres.; James T. Chatterton, Mackay Radio, president; Maj. Gen. A. L. Pachynski, USAF(Ret.), Lenkurt Electric, 2nd vice pres. Back row, left to right: C. V. N. Steffen, Pacific T&T, secretary; Lt. Col. W. G. Damerow, USA(Ret.), Pacific Gas & Electric, historian; Capt. T. H. Templeton, USN (Ret.), Stanford Research Institute, director; and Vice Adm. John R. Redman, USN(Ret.), member.

Scott-St. Louis

Brig. Gen. Norman L. Peterson, USAF, Vice Commander of Air Weather Service with Headquarters at Scott Air Force Base, was the guest speaker at the chapter's February 6 dinner-meeting. Using as his topic "The Global Mission of the Air Weather Service," Gen. Peterson presented an illustrated talk as a means of acquainting the 55 chapter members and 9 guests with the mission and operations of Air Weather Service (AWS) as a sub-command of Military Air Transport Service (MATS) and as a supporting service for all commands within the USAF, in all matters pertaining to weather.

In building toward its aim of electronic automation, AWS has established three major programs: (1) Weather observing and forecasting system 433L (2) Airborne weather reconnaissance system and (3) Earth satellite.

Among the distinguished guests and members attending were Maj. Gen. D. C. Doubleday, Commander, and Brig. Gen. Harold L. Smith, Deputy Commander, Headquarters AACS.

Seattle

Ladies' night was the occasion of the February 13th meeting of the local chapter held at the Benjamin Franklin Hotel. After dinner Mr. Frank L. Simmonds of the Boeing Airplane Company entertained the members and their wives with colored slides and a narration of his recent trip to Hawaii.

The main speaker of the evening was Mr. John Desmond, Assistant Special Agent in Charge, Seattle Office, F.B.I. who spoke on "The Service and Problems of the F.B.I." In his talk he discussed the sharp increase in the crime rate in the United States, the availability of F.B.I. services in national disasters and to local law enforcement agencies. Mr. Desmond closed by stressing the importance of public cooperation with law enforcement agencies by reporting all instances of criminal violation and by serving as witnesses.

(*Continued on page* 56)

***Scott-St.Louis** — Lt. Col. Herbert E. Greuter, USAF, Chief, St. Louis Air Procurement District Office, Air Materiel Command, addressing the chapter's January meeting on "The Air Materiel Command Logistic Management Concept."*

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IRE Salutes Government Research

PARTIAL CONTENTS OF THIS GOVERNMENT RESEARCH ISSUE:

"The Basis of Our Measuring System" by A. G. McNish, National Bureau of Standards

"The DOFL Microelectronics Program" by T. A. Pruge, J. R. Nall & N. J. Doctor, Diamond Ordinance Fuze Labs.

"VFL Propagation Measurements for the Radux-Omega Navigation System" by C J. Casselman, D. P. Heritage & M. L. Tibbals, U. S. Naval Electronics Lab.

"Submarine Communication Antenna Systems" by R. W. Turner, U. S. Naval Underwater Sound Lab.

"Some Characteristics of Persistent VHF Radio Wave Field Strengths Far Beyond the Radio Horizon" by L. A. Ames, E. J. Martin & T. F. Rogers, Air Force Cambridge Research Center

"Phenomena of Scintillation Noise in Radar Tracking Systems" by J. H. Dunn, D. D. Howard & A. M. King, U. S. Naval Research Lab.

"On Models of the Atmospheric Radio Refractive Index" by B. R. Bean & G. D. Thayer, National Bureau of Standards

"Image Intensifiers and Image Converters for Military and Scientific Use" by M. W. Klein, Engineering Res. & Dev. Labs.

"A Light-Weight and Self-Contained Airborne Navigational System" by Staff, Defense Research Board, Canada

"The CAA Doopler Omnirange" by S. R. Anderson & R. B. Flint, U. S. Dept. of Commerce

"Pulsed Analog Computer for Simulation of Aircraft" by P. N. Herzog, U. S. Naval Training Device Center

"Progress and Problems in Army Communications" by R. E. Lacy, U. S. Army Signal Res. & Dev. Labs.

"The Engineering of Communication Systems for Low Radio Frequencies" by J. S. Belrose, W. A. Hatton, C. A. McKerrow & R. S. Thain, Defense Research Board, Canada

"Numerical Approach to Electronic Reliability" by J. J. Naresky, Rome Air Development Center

Again government projects make the news as space satellites relay world weather data and rockets orbit the sun. The *Institute of Radio Engineers* salutes government contributions to progress in radio-electronics in the *Special May Issue* of **PROCEEDINGS OF THE IRE.**

The big May **PROCEEDINGS OF THE IRE** gives deserved recognition to the government laboratories and bureaus engaged in electronics research and development, and brings to its readers information about the invaluable work being done by engineers and technicians in federal employ. Included are 40 technical papers dealing with the most important aspects of current projects.

Radio-Electronics Behind the Headlines

This Special Issue reveals how the government is meeting the challenge of creating new and better electronic devices for peaceful and utilitarian purposes, as well as how it is meeting the pressing need for advanced national defense systems. Also discussed are future safeguards for the security of the free world.

Presentation of this special issue on *Government Research* is in keeping with the IRE's policy of bringing to the world of radio-electronics the latest news of subjects of special interest and significance. Such a practical policy enables the IRE to provide a valuable service to the industry by making technical material and pertinent information available not only to its 72,000 members, but to informed non-members as well.

Read this informative report on *Government Research* in the publication that records progress. If you are not a member of the IRE, be sure to reserve a copy of the May **PROCEEDINGS,** now.

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REMEMBERS THE MAN

All IRE members will receive this May issue as usual. Extra copies to members, $1.25 each (only one to a member)

NEW PRODUCTS FROM INDUSTRY

Nuvistor (New Look) Tube Design

A new development in electron tube design, called Nuvistor, which will lead to important electronic advances in such instruments as television sets, communications receivers and computers as well as more compact and efficient electronic equipment for defense and industry, has been introduced by the Radio Corporation of America. According to the company, the new design represents a major breakthrough in tube size, performance, power drain and reliability. "It opens the way to mass production of high-performance, thimble-size tubes having improved ruggedness, reliability and efficiency" and shows that electron tubes have by no means reached the limit of their capabilities.

The company reports that various experiments and rigorously controlled laboratory tests have illustrated the high-temperature capabilities of Nuvistor tubes as well as their reliable performance under conditions of severe shock and continuous vibration. These features along with the tube's compactness and high efficiency should make the Nuvistor design ideal for military and airborne electronic systems.

The improved electrical and thermal characteristics should render the Nuvistor highly useful in the television industry. The small-signal triode and tetrode should be of particular interest for TV tuner designs and intermediate frequency amplifiers. Nuvistor tubes are also expected to offer advantages for high-speed data processing equipment.

The Nuvistor design also has several construction advantages: cylindrical symmetry and cantilever construction which permit the use of accurate jugs for assembly; the complete elimination of micas; high-temperature processing which results in super-clean structure, and the elimination of glass that might shatter under mechanical or thermal shock.

Direct Focusing Ultraviolet Microscope

Through the combined efforts of Bausch & Lomb Optical Co., of Rochester, N. Y. and RCA, an ultra violet microscope which permits visual focusing has been developed. Due to the RCA "ultrascope tube," an electronic component capable of receiving an ultraviolet image at one end and converting it to a visible image to be viewed under magnification at the opposite end, the photomicrographer can now visually focus the image using ultraviolet light; he no longer has to use a substitute visual wave-length to estimate his ultraviolet focus. Portable and of compact size, it will occupy a minimum of laboratory space.

The B & L U-V Photo-Microscope is expected to have wide application in medical research, particularly in the examination of living cells under ultraviolet light. In addition to its value as a medical research instrument, it should have extensive clinical usage for tissue cell screening and bone marrow observation, petrography (description and classification of rocks), study of synthetic fibers and pharmaceutical controls.

Transistor Switching Circuitry

Navigation Computer Corporation has announced the publication of a 16-page booklet covering the field of transistorized pulse handling techniques. Entitled *Notes on Transistor Switching Circuitry*, the booklet includes diagrams for programming pulses, delays serial to parallel conversion, ring counters, cycle distributors, binary counting, electronic switching, etc.

Free copies may be obtained by writing to Navigation Computer Corp., 1621 Snyder Avenue, Philadelphia 45, Pa.

Flash X-Ray for Ultra Highspeed Recording

The development of new flash x-ray equipment for use in recording explosion processes and measuring the speed of hyper-velocity objects has been announced by Zenith Radio Research Corporation of Redwood City, Calif., a subsidiary of Zenith Radio Corporation. The equipment is described as being capable of producing x-ray type "shadow pictures" of high-speed phenomena such as the fragmentation of ballistics and high explosives, as well as the "burning" pattern of solid fuel propellants used in rocketry and missile work.

Company scientists report that the flash of x-radiation is so brief (about 1/6 of a microsecond) and the time of its occurrence is under such precise control that the motion of a high-speed projectile in flight may be completely stopped at precisely the desired position. Utilizing a newly developed air-core pulse transformer and special "triggering" circuits, the equipment is claimed to perform with a degree of reliability and accuracy never before achieved by flash x-ray systems.

Unlike other flash x-ray equipment in which condensers apply the full accelerating voltage directly to the flash x-ray tube, Zenith's equipment stores the energy at a relatively low potential. The pulse transformer steps it up to the required peak accelerating voltage only when the tube's operation is desired. Full accelerating voltage is obtainable within the range of 60-120 kv. The pulse transformer also reduces the amount of reverse current through the tube.

The equipment uses either a Criscuolo or a WL2045 flash x-ray tube, both presently on the market. Duration of the x-ray pulse produces a film blackening sufficient for shadow-graphic work at distances up to 12 and 16 feet depending on which type of tube is used.

High-Frequency, Germanium, Diffused-Base Transistors

The commercial availability of a new series of germanium high frequency, diffused-base "mesa" transistors featuring alpha cutoff frequencies up to 750 megacycles and power dissipations of 750 milliwatts has been announced by Texas Instruments, Incorporated of Dallas.

The inherent high reliability of this new series of transistors (2N-1141, 2N1142 and 2N1143) made possible by the diffused-base process, coupled with new highs in power and frequency performance provides significant advances to the transistorization of military missile and other airborne military circuitry. Featuring minimum current gains of 12, 10 and 8 db at 100 megacycles, the devices operate at junction temperatures up to 100°C with 750 milliwatts power dissipation at 25°C case temperature.

Due to these high frequency and power characteristics, the transistors are expected to have wide application in UHF power oscillators and amplifiers.

Crystal Controlled Search Radar

A new search radar developed for the Navy by Westinghouse Electric Corp. departs from previous radar designs in that it is crystal controlled and thereby achieves higher stability. Another feature is the use of a shaped pulse, designed to decrease the required bandwidth for operation, instead of a rectangular pulse. This permits the high-power system to work in crowded environments without interfering with other electronic devices.

The control-monitor cabinet centralizes in one location the several important junctions of operating controls, condition indicators—such as supervisory lamps, voltage and r-f power monitors, the noise figure monitor and monitor oscilloscope, and the trigger generating circuits. To simplify maintenance, the necessary testing equipment is built into the unit.

Selenium Rectifiers

For efficient and economical a-c to d-c rectification, Syntron Company is producing a selenium rectifier in a wide range of sizes. A new 10-page illustrated catalog presents complete descriptions, data and specifications for cell sizes ranging from 1" square to 12" x 16". The catalog also illustrates rectifier circuits and gives four pages of continuous d-c current ratings for 26, 33, 40, 45 and 52 volt RMS cells.

Free copies are available upon request from Syntron Company, 1194 Lexington Avenue, Homer City, Pa.

Epoxy-Coated Precision Film Resistor

A new resistor which is expected to have wide application in transistorized circuitry has been introduced by Corning Glass Work's Electronic Components Department of Bradford, Pa. The N style resistor, produced in ½ (N70) and ¼ (N 65) watt sizes, provides excellent insulation and moisture resistance, according to the company.

Both resistors are dip-coated with a new epoxy, developed to provide moisture resistance and insulation surpassing requirements of the military specifications.

The resistors are suitable for a wide variety of applications requiring precision characteristics. They are reported to be particularly valuable for computers, where long term stability is critical and for missiles where long shelf life is required.

Transistor Transformers

One of the results of increased use of transistor devices has been the development of a new series of transistor power supplies by Triad Transformer Corp., a division of Litton Industries of Los Angeles. Utilization of new techniques and improved materials in the design of epoxy molded toroidal type transformers has increased efficiency and life expectancy and reduced noise level, size and weight.

Designated the TY series, the new units provide DC output from mobile supplies of either 6, 12 or 28 volts. The units are compact and can be stacked on a single mounting bolt through a centrally located hole, simplifying series parallel connections to the peripherally located terminal pins. This stacking arrangement makes it possible to double or triple power output with only a negligible sacrifice in efficiency.

The operating frequency falls in the range from 2500 cycles for the higher power units, to 5000 cycles for the low power ones.

Microwave Tubes

Full production of planar triodes and microwave tubes has recently begun at Allen B. DuMont Laboratories, Inc. of Clifton, New Jersey. The company's first microwave tube (Type 6280 Planar Triode) operates in the 4,000 to 5,000 mc range and with the exception of much tighter tolerances, is a direct replacement for the Type 416B planar triode, a tube already on the market.

Originally developed for use in telephone repeaters, the company describes these tubes as having found important uses as oscillator and low-noise amplifier tubes for all types of microwave communications equipment, particularly for those used by the military services.

The vacuum tube is gold plated for high Q operation and has a gain of 9 db minimum at 50 mw output.

Ground-Station Subcarrier Oscillators

Now available for ground-station telephone, radio or microwave data-transmitting use are a new group of adjustable and servicable voltage-controlled FM subcarrier oscillators. Introduced by the Geotechnical Corporation of Dallas, Texas, the oscillators plug easily into a transmitting multiplexer with conventional 9-pin octal connectors. Prototypes have operated for 11 months with an outage time of less than one minute.

Tubes are mounted externally to dissipate heat, and modulation can be adjusted manually. Over-all size is 4⅞ x 3⅞ x 1⅝ inches, filament power may be either AC or DC, input is ±2.5 volts into 500 K ohms, and output is 3 volts at 5 K ohms from low pass output filter.

Chart Typewriter

A new development in typewriters is the chart-typer that enables typing of the most complex chart material. Made by SIEMAG Feinmechanische Werke GMBH in West Germany and distributed by Continental Office Machines, Inc. of New York City the chart-typer is a time- and effort-saving device. The keyboard has a normal upper case alphabet and figures. Instead of lower case letters, however, the machine has 27 different chart symbols. The alphabet and letters have been especially designed to harmonize with the chart symbols, all of which are in shift position so that no shifting is required when either chart-typing or regular typing. An easily adjustable attachment permits the typing of charts on any chart paper, accurately scaled and aligned. A carbon ribbon attachment enables the material typed to be immediately ready for offset printing production.

Dead Reckoning Analyzer

A dead reckoning analyzer that automatically indicates a vessel's latitude and longitude on speedometer-like dials has been announced by Radio Corporation of America. Produced by the Belock Instrument Corporation's Marine Division the DRA-2 was designed for use on either large or small vessels. It weighs 65 pounds, with the indicator cabinet measuring 16⅛" high, 16½" wide and 12¼" deep, and can be mounted virtually anywhere on a ship.

According to RCA, the device is an analog computer of rugged and simple design. Between the normal celestial and loran fixes, it provides the navigator with his ship's position instantly and relieves him of the necessity of plotting position at short intervals or every time the ship changes course.

The method of determining position is a manual feeding of the ship's original position by latitude and longitude input knobs on the face of the indicator cabinet. The course is then given to the instrument by hook-up with the gyro-compass, the speed is inserted through another input knob, and the current latitude and longitude are thus shown on speedometer-like dials.

Micro-Miniature Battery

A new mercury battery, said to be the smallest battery ever manufactured for commercial use, has been developed by the Mallory Battery Company, a division of P. R. Mallory & Co., Inc. of Du Quoin, Ill. 0.300 inches in diameter and 0.125 inches high, the new cell (RM-312) is designed to fit the dimension requirements of the military micro-module program. Its indicated uses include extremely small hearing aids, portable radiation detectors and other miniaturized electronic devices.

The estimated energy life of the battery is 36 milliampere hours at a discharge of 2 milliamperes, at 1.22 average volts. Voltage remains substantially constant to the end of useful life. It can be stored for periods in excess of one year without appreciable loss of capacity.

Sub-Miniature Diodes

Minifiers, new sub-miniature selenium diodes, specifically designed for high reliability and long operating life have been announced by International Resistance Company of Philadelphia.

Minifiers are used in a broad range of electronic applications such as computers, electrical measuring instruments, radio and television, transistorized equipment, etc. Among the specific circuits in which these diodes are applicable are detectors, gating, logic circuitry, phase comparators, bias supplies, clamping, clipping, AFC, AGC and sensitive DC relays.

The new diodes are assembled in a drawn brass housing to provide high efficiency heat dissipation and better mechanical protection. The total assembly is 3/32" in diameter and is insulated to permit use where space is a limiting factor. The useful life expectancy is over 20,000 hours when operated within ratings.

Waveguide Window for Radar

A new waveguide window for use in multi-megawatt applications with WR-2100 waveguide has been developed by Special Products Division, I-T-E Circuit Breaker Company of Philadelphia.

The new window, the latest addition to the company's line of large waveguide components for high-powered radars, is reported to provide excellent radio-frequency continuity and a low standing-wave ratio of 1.03 over a 10% band.

A waveguide window, which act as a barrier to air flow without block ing r-f energy, is normally installe downstream in a waveguide ru where a blower has been added t provide cooling. The new windo achieves its high power-handlin capabilities through use of a specia cross-linked polystyrene as th mechanical barrier. A new windo mounting scheme provides for good r-f continuity and elimination o arcing.

New Literature

Revised Transistor Home-Study Course

CBS-Hytron has completely revised and expanded its home-study course in transistors to include the latest information on transistor devices and applications. The new version of the course for technicians and engineers offers ten intensive lessons covering simplified basic transistor theory with practical experiments and servicing techniques for amplifiers, oscillators, rectifiers and deflection circuits.

Correction and advisory service is included in the course expanded over 20% beyond its original scope. A descriptive folder, PA-276, contains a description and complete table of contents and may be obtained from CBS-Hytron Advertising Service, Parker Street, Newburyport, Mass.

Increased Use of Industrial Radioisotopes in Electronics

In a recent study, the Atomic Industrial Forum, national association of the U. S. atomic industry, has found an increase of more than 17% in the number of industrial radioisotope users in the electronic, electrical equipment and instrumentation manufacturing fields in 1958. In a report entitled *The Atomic Industry —1958*, outlining the role of American industry in developing the commercial applications of atomic energy, the Forum noted that the number of new companies of all types using radioisotopes increased nationally by almost 13%. More than 2000 industrial organizations in the U.S. have been licensed by the Atomic Energy Commission to use AEC-supplied radioisotopes since the beginning of the distribution program. The report includes detailed summaries of both reactor and non-reactor activities. For further information contact: Atomic Industrial Forum, 3 East 54th Street, New York 22, N. Y.

meets Specification MIL-S-6807

- 8 contact positions.
- Up to 6 sections, or poles.
- Unlimited or limited rotor movement by moving two stop screws.
- Electrical ratings:
  5 amp. 28 v. d-c, resistive.
  2.5 amp. 28 v. d-c, inductive.
  2.0 amp. 28 v. d-c, lamp load.
  5.0 amp. 115 v. 400 cps, resistive. 2.0 amp. at 50% power factor.

This ESCO rotary multipole tap switch is designed to meet Specification MIL-S-6807 and can be assembled (Type JL) to conform to MIL-S-21604 BUShips Drawing 9000 - S6202 - 74422. Rotor movement can be changed from unlimited to limited (2 to 8 positions).

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ITEMS OF INTEREST

From Government, Industry and the Services

Collins Radio Sextant

For almost a year the moon has been tracked continuously by radio through the use of a new precision radio sextant designed and constructed by Collins Radio Company. Information concerning the tracking, which started late in the summer of 1958 at the company's Feather Ridge Observatory near Cedar Rapids, Iowa, has only recently been released due to strict security requirements. While much of the project is still classified, sufficient information has been made available to indicate a significant advancement in navigational systems.

Due to the extremely weak radio waves emitted by the moon, the development of a sextant to track it accurately required major improvements in both the electronic and mechanical arts.

The power of the moon (whose radiation is close to 50 times weaker than that of the sun) available to the sextant must be multiplied by 500,000 billion to equal that used by a small Christmas tree light. In order to track accurately, the receiver must distinguish power changes that are a minute fraction of the total power used. According to the company, the sextant is capable of tracking both the moon and the sun under all weather conditions from their rising to their setting.

The conventional sextant, invented in the 18th century, is a hand-operated instrument for measuring angular distances, used especially at sea, to observe altitudes so as to ascertain latitude and longitude. The following is an explanation of the operation of a radio sextant as described by a Collins official. The amplitude of the sun or moon radiation fluctuates in the same fashion as the Johnson noise (the noise produced by thermal agitation of charges in a conductor) making detection of the weak signal difficult. In the Collins radio sextants the antenna scans a circle around the rim of the sun or the moon. If the antenna is pointed directly at either, the signal received will show no modulation at the scanning frequency, but if the antenna is displaced slightly, the moon or sun signal will be modulated. Phase-sensitive detectors derive error voltages which are used to make the antenna track the sun or moon.

The Collins sextant is described as the most sensitive radio receiver ever built for the measurement of thermal radiation in the short microwave region. This receiver which utilizes a 5-foot parabolic type antenna and operates at a wave length of 1.8 centimeters, allows the determination of the antenna position with the necessary precision.

A second function of the sextant is that of a precise compass with more than ten times the accuracy of present marine compasses. The new radio sextant, designated AN/SRN-4, was developed under a research and development contract with the Navy's Bureau of Ships which called for two sextants; one to be installed aboard the *USS Compass Island* for use in navigation research and the other installed at Collins' Feather Ridge Observatory for further experimentation.

Aboard the *USS Compass Island*, data obtained from the radio sextant observation are coupled with the vessel's precision time standard and presented directly to a navigational computer. The computer then combines celestial and inertial data to determine the ship's position and the location of true north.

The potential applications of the SRN-4 are extensive: several ships could rendezvous at any point with complete radar and radio silence; approach to fog-bound ports could be made easier; radar picket vessels could know their exact position and would be able to pinpoint enemy vessels or aircraft coming in for an attack; vessels in task forces and convoys could disperse, yet still maintain knowledge of each other's position, and missiles could be directed to a given geographical position. In discussing these applications, scientists believe that this is a new era in which military tactics must be conducted with a precise and continuous knowledge, under all conditions, of latitude and longitude as well as the direction of north. "The precision radio sextant opens the door for the development of new naval tactics."

The commercial possibilities of the sextant are equally considerable. Although, today's navigation still uses the hand-held optical sextant to shoot the stars at dawn and dusk, the SRN-4 does not require clear weather to operate. Regardless of weather, it determines automatically and continuously the position of the moon and the sun through the reception of the microwave energy they emit.

Pilot Data Processor

The National Bureau of Standards has planned a new Pilot Data Processor, in order to help carry out its program of investigating a wide variety of unusual data processing problems of importance to the Government. PILOT is to be a flexible, multi-purpose facility with a wide repertoire of logical and computing capabilities which are especially suited to the experimental investigation of Government problems. Its design has been completed and construction of the equipment is under way.

Submerged Submarine Takes Celestial Fix

Details of a device that enables a submarine to take a celestial fix while submerged have recently been released by the Navy. Called SCAR (Submarine Celestial Altitude Recorder), the device, according to Cdr. William Anderson, "ranks with the development of the snorkel and the new Albacore submarine hull design as a truly significant advance in submarine navigation." With the development of the snorkel and atomic power, submarines could remain submerged on extended trips. Now, using equipment such as SCAR, submarines can leave the United States and navigate anywhere in the world without surfacing.

Being produced by Sperry Piedmont Company, a division of Sperry Rand Corp., SCAR can take a celestial fix from periscope depth. When the star, moon or sun is sighted a switch on the scope is pressed and the exact altitude of the celestial body is computed automatically, giving the angle of sighting in degrees and minutes and the time in hours, minutes and seconds. The information is then printed instantaneously on a slip of paper.

Color Film of Eye

Vast new possibilities for investigation of events in the brain as well as circulatory disturbances related to heart diseases and arteriosclerosis have been opened as a result of the first full-color motion picture ever made of the back of the living, sighted human eye. The special instruments used permit observation of tissues and blood vessels in the eye and brain membrane without surgery.

Producer of the film, Dr. Murray C. Brown of the National Institutes of Health, said that the film was made possible by the development of special color television equipment by CBS Laboratories for use as a medical research tool. He added that the CBS Laboratories' field sequential color television system is the only device that makes such blood vessel and tissue exploration feasible.

His film reports that the system, combined with newly developed tubes, is so sensitive that it uses practically no light, therefore the eye can be exposed to it for long periods.

First studies of the blood vessels in the eye show the length of time it takes for a harmless dye to travel from the arteries of the retina to the veins, which may be of great importance in diagnosing arteriosclerotic changes.

Other early use of the color TV apparatus opens possibilities of research into the effects of stress on the brain and circulatory system. Dr. Brown said that the obvious effects of electric shock and the drug metrazol are the same: they both cause convulsions and are sometimes used for treating schizophrenia. The film shows that there are differences. The drug causes contraction of the blood vessels while electric shock causes dilation. Comparison with standard preparations seems to show that the same events occur in the blood vessels of the retina as occur in the brain. The changes in the retina, which are easily observed, might therefore be used as an index to changes that cannot be seen in the brain without surgery.

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MARS May Speakers

May speakers for the First Army Military Affiliate Radio System (MARS) SSB Technical Net will include:

May 6: "American Antarctic Communications Adventures" by Amory H. Waite, Jr., Project Engineer, Exploratory Research Division, Communications Dept., U. S. Army Research & Development Laboratory, Fort Monmouth.

May 13: "Telemetering for Guided Missiles" by J. R. Popkin-Clurman, W2LNP, President & Director of Research, Telechrome Mfg. Corp.

May 20: "The Megacoder" by Harry Kihn, Member of Technical Staff, RCA Laboratories.

May 27: "Novel Tuning Methods at UHF & Lower Micro-Wave Frequencies" by Edward D. Nadler, Electronics Engineer, Lewyt Mfg. Corp.

The talks will be held on Wednesday at 9 PM EDT on 4030 KC, upper sideband. Upon completion of the May schedule, MARS will recess until September, at which time announcement will be made of the fall lectures.

"Ham of the Year"

Julius M. J. Madey, a young man of 18 years, from Clark, N. J., was the recipient of General Electric's 1958 Edison Radio Amateur award trophy and $500 prize. The award was presented at a banquet at the Sheraton-Carlton Hotel in Washington, D. C., on February 26, 1959. Mr. Madey, who established an outstanding record as a ham operator, was cited for spending an average of 90 hours a week handling thousands of messages and telephone calls for isolated personnel in the Antarctic, Arctic and South Pacific.

The principal speaker of the evening was Rev. Daniel Linehan, S.J., chairman of the geophysics department of Boston College and an enthusiastic radio amateur. AFCEA Directors attending the banquet were George Bailey, Executive Secretary of IRE (one of the nation's recognized ham operators), and Roland Davies, Editor and Publisher of *Telecommunications Reports.*

Names in the News

Major General W. Preston Corderman, Vice President of Litton Industries has been named President of the Times Facsimile Corporation which was recently purchased from The New York Times Company by Litton. **Austin G. Cooley**, who has written articles for SIGNAL and has presented a technical paper on facsimile at the 11th AFCEA Convention, will continue in his present capacity as Executive Vice President of Times Facsimile.

Colonel Elmer L. Littell has been promoted to the rank of Brigadier General in the U. S. Army Signal Corps. General Littell has been Commanding Officer of the U. S. Army Signal Supply Agency and its regional offices in Philadelphia since June 1957.

Dr. Howard A. Wilcox brings vast experience to his newly appointed position as a Deputy Director of Defense Research and Engineering, Department of Defense. He was formerly Assistant Technical Director of Research at the Naval Ordnance Test Station, China Lake, California.

Dr. Richard A. Weiss, Scientific Director of the Army Research Office, Office of the Chief of Research & Development, Department of the Army, was one of 10 Federal Government employees selected by the National Civil Service League for a 1959 Career Service Award. **Honorable Frank R. Pace**, former Secretary of the Army and now President of General Dynamics Corp., was the principal speaker at the banquet at which the awards were presented.

Dr. John P. Hagen, of the Naval Research Laboratory, was presented with a Distinguished Civilian Service award on 16 March '59 by Secretary of the Navy Thomas S. Gates for his work on the Vanguard project. Presentation of the award was part of a two-day observance of the first anniversary of the Vanguard I earth satellite.

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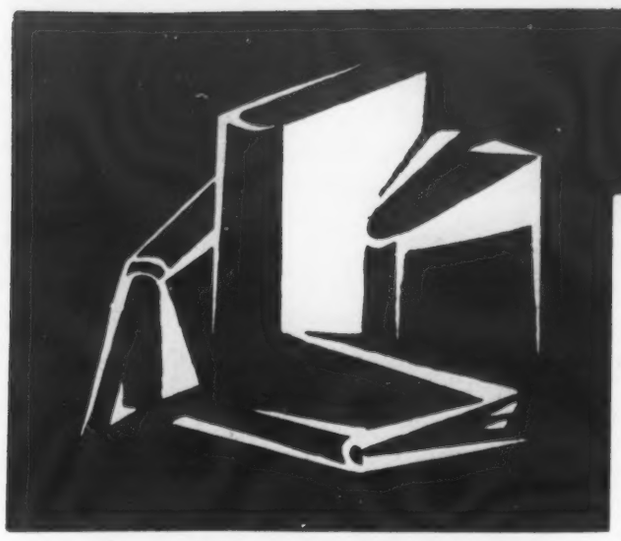

Books

RADIO ENGINEERING HANDBOOK, Fifth Edition, Editor-in-Chief, Keith Henney. McGraw-Hill Book Company, New York. 1800 pages, $25.00

There is no doubt that with the growing complexity of today's technology, problems in radio engineering can be solved more quickly, easily and accurately with the aid of modern data and methods. The revised edition of the *Radio Engineering Handbook* offers to designers, engineers, and technicians, working principles, standards and procedures that may mean speedy answers to both routine and special assignments in radio engineering.

A valuable reference work, this new edition covers communications, broadcasting, aircraft radio, television, facsimile, navigation aids and telephony. It discusses both fundamental and specialized applications; resistance, inductance, waveguides and cavity resonators, loudspeakers, transmitters and receivers as well as numerous other aspects of radio. And above all, it brings the reader up to date with modern advances and developments in areas such as diodes, high-frequency tubes, transistors, nonlinear circuits, audio-frequency circuits and power supply.

THE STORY OF AVIATION, by David C. Cooke. Archer House, New York, 256 pages, $4.95.

From the days of Daedalus and Icarus, man has dreamed of flying: to escape from his enemies; to conquer the heavens; to establish military prowess, or to explore the unknown. *The Story of Aviation* traces the history of man's flight from his first dream shrouded in the myths and legends of ancient peoples to the latest supersonic jets and rockets. The experiments of da Vinci, the attempted flights of the "bird-men," the first journey of the balloonists, the Montgolfier brothers, the pioneer researchers of the nineteenth century are all presented in a vivid background to the day in 1903 at Kitty Hawk that set the stage for the unending progress of the air age.

The impetus provided by the role of aircraft in World War I is well documented and evaluated. The days of Fokker, Immelman, Guynemer, Richthofen and the Lafayette Escadrille, the growth of aviation between wars and the Age of Lindberg are portrayed in detail. Then came World War II with its air armadas surpassing in destructive power any armies the world had seen.

Also included are chapters devoted to the U.S. Air Force and Naval Aviation, a survey of commercial airlines and a summation of the most recent jet-aircraft research.

THE SOVIET NAVY, edited by M. G. Saunders, R.N. Frederick A. Praeger, Inc., New York. 333 pages, $7.50.

Of all the forces that create the sensitive balance of power existing today, the Soviet Navy is perhaps one of the most puzzling. The small amount of specific information previously available makes an assessment of its strength extremely difficult. Its tremendous expansion to a position of at least second among the world's navies has rendered knowledge of Russian seapower indispensible to an understanding of East-West relations. *The Soviet Navy* attempts to provide the first comprehensive and authoritative account of the Soviet Navy today.

Almost every aspect of Russian naval affairs is covered: the history of the development of a Russian navy beginning with Peter the Great; its role in two world wars related from the German and British viewpoints; its relationship to the revolution; the elements that compose Soviet seapower, such as its organization, training and technology, and an awareness is strongly urged of the strategic and geo-political implications of Soviet naval power in the uneasy postwar world of tomorrow.

The book is composed of contributions from eighteen contributors from eleven countries including Great Britain, France, the United States, Germany. This provides an excellent opportunity to present widely varied approaches to the covering of similar material. Several informative illustrations and maps are dispersed throughout, and there is a section at the end containing brief biographical data on each of the contributors.

PROGRESS IN PHOTOGRAPHY: 1955-1958, Editor in Chief, D. A. Spencer, The Macmillan Company, New York, 162 pages, $10.00.

A comprehensive reference work, *Progress in Photography* is an international record of significant advances achieved by scientific research and technological development in the field of photography.

Authoritatively compiled from articles by scientists, technicians, executives and photographers with advanced interests and experts in each of their fields, the principal sections cover: practice and new techniques which analyzes the development and value of xerography and thermo-fax, and contains several pages of color prints illustrating the new amateur color print processes in all parts of the world; theory and materials which deals with new chemical and physical processes in development, latent image formation and emulsions, from Great Britain, Germany and Russia; the economics of the photographic industry as related to its growth in various countries; the literature of photography as contained in libraries and archives and a discussion of Russian literature on the photographic process. The final section describes the progress of special applications for photography.

THE PRACTICAL DICTIONARY OF ELECTRICITY & ELECTRONICS, by R. L. Oldfield. American Technical Society, Chicago. 216 pages, $5.95.

A basic trade vocabulary of modern electricity and electronics, suitable for tradesmen, engineers and technicians in all branches of modern electronics, is to be found in *The Practical Dictionary*. Written in response to a growing industrial demand for a practical reference work which would bring together in a single volume the terms most often used, particular attention has been given to the investigation of terminology relating to theory and practice in all related fields.

A dictionary for those concerned with the service, operation and use of electronic equipment as well as those involved in the selling, distribution and managerial aspects, it provides a solid core of trade information compiled and critically selected from up-to-date trade journals, suppliers' catalogues, company manuals and various other sources.

A 38-page handbook section is included at the end, containing the formulas, tables, symbols and circuit diagrams that occur most frequently as the needs of those working in electricity and electronics.

(*Continued from page* 46)

Southern Connecticut

Mr. Lambert Lind, Special Assistant to the Director of the Advanced Research Projects Agency, Department of Defense, was the guest speaker at the February 26th chapter meeting. The joint dinner-meeting was held with the Stamford Engineering Society at the Clam Box in Cos Cob. The topic of Mr. Lind's talk was "The Advance in Space Power for Peace."

Among the 20 members and 45 guests present, was Glenn D. Montgomery, AFCEA Regional Vice President, who gave an account of regional and national AFCEA activities.

Tokyo

Tokyo's new TV tower, which is 13 meters higher than the Eiffel Tower of Paris, was initiated as a meeting place for local business and social groups on January 13th when more than 230 members and guests of the Tokyo AFCEA chapter met there.

Among the guests of honor at the luncheon in the world's tallest self-supporting steel tower, were Maj. Gen. David H. Tulley, Commanding General U.S. Army, Japan; Maj. Gen. Kenneth B. Hobson, Vice Commander, 5th AF; Brig. Gen. Alexander M. Willing, Chief of Staff, HQ U.S. Army, Japan; RAdm. Frederick S. Withington, Commander, Naval Forces, Japan, and RAdm. F. C. Stelter, Jr., Deputy Chief of Staff, U.S. Forces, Japan, representing Lt. Gen. Robert W. Burns, Commanding General, U. S. Forces, Japan. The meeting was presided over by the Chapter President Capt. Frank Dingfelder, USN.

Dr. Saburo Matsuo, Director, Electronics Division, Tokyo TV and Radio Tower Co., Inc., and Mr. Frank Colonna, RCA, supervised the arrangements.

During the brief, informal speeches prior to lunch and the inspection of the tower, Dr. Matsuo explained why the tower was built. The primary purpose of the tower was not to have the biggest and best, but to provide more extensive TV and radio reception in the Tokyo area and Kanto Plain. (See article by Dr. Matsuo on page 32.)

Donald Hughes, Philco, announced plans to establish an AFCEA scholarship for promising high school graduates.

Washington

Maj. Gen. Henry R. Paige, Assistant Chief of Staff, Headquarters, U. S. Marine Corps, spoke on "Marine Corps requirements in the field of communications and electronics" at the chapter's February 5th luncheon.

Other distinguished guests at the head table were introduced by Chapter President John R. O'Brien of Hoffman Laboratories as follows: Chaplain Francis T. O'Leary, Office, Chief of Chaplains, U. S. Navy; Lt. Col. George F. Bowman, Deputy Asst. Director of Aviation, USMC; Capt. L. G. Shaffer, J-6, Joint Chiefs of Staff; Col. David M. Stonecliffe, Asst. G-3, USMC; Rev. Dick Irvin, North Bethesda Methodist Church; Lt. Col. Robert W. Glickert, Deputy Director, Division of Information, USMC; Maj. Gen. Leslie Thuillier (British Signal Officer, Ret.), Co-ordinator of all communications and electronics between British military services and the British Government, and a member of AFCEA's London Chapter; Col. Jean Moreau, USMC (Ret.), former president of Marine Corps War Memorial; Brig. Gen. George Shell, Deputy Chief of Staff, R&D, USMC; Brig. Gen. Paul R. Tyler, Director of Material Div., USMC; and Maj. Gen. Carson A. Roberts, Deputy Chief of Staff, Plans, USMC.

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Personnel Available

As a service to AFCEA members, SIGNAL will make space available in this column for those members who are interested in employment in the communications, electronics and photography industries. Any member is entitled to three insertions in the magazine on a space available basis, free of charge. Please limit your notice to 5 lines. In replying, employers are asked to address: Box ------, SIGNAL 1624 Eye St., N. W., Washington 6, D. C. Letters will be forwarded to the AFCEA member.

CONTRACT ADMINISTRATION, LIAISON OR RELATED POSITION. Graduate E. E. with Signal Corps electronic experience as officer and Navy civilian work as Contract Administer and General Engineer in electronics (Aircraft, Guided Missiles, Nuclear Power) desires position in private industry. Box 145.

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CAPTAIN, ED, USN, electronics, retiring Aug. 1959, age 48, wishes to apply results of over 16 years broad responsible experience in management of engineers to problems of private industry. Post card brings detailed résumé. Box 149.

MISSILE TRACKING SEA-LAB

This huge antenna is part of an electronic and optical system that RCA installed and is operating on the S.S. American Mariner. The purpose of the equipment, for which the ship has been refitted, is to provide the most precise data yet obtained at sea on missile flights over a range extending from Cape Canaveral, Fla., to the area of Ascension Island. The project is sponsored jointly by the Advanced Research Projects Agency, Department of Defense and the Army Ordnance Command. A scientific staff—most of them RCA personnel—will operate the equipment and report on missile performance from descent from space to final plunge, the data to be shared by all branches of the armed services.

RADIO CORPORATION of AMERICA

DEFENSE ELECTRONIC PRODUCTS
CAMDEN, N. J.

Tmk (s)

Sir Francis Drake Cracks a Cas

One foggy day in 1588, a single ship of the Spanish A
managed to sneak behind Drake's entire British fleet lying in the E
Channel off Plymouth Hoe, and drop a 10 pounder smack in the
of a bowling match between Sir Francis and his friend Walter R

The new radar was caught completely by surprise. Had th
(Identification: Francis or Foe?) system failed? Was the op
tuned to the wrong Channel? Was there something wrong wi
tubes? Drake was determined to find out. He was inside the shac
trice, whatever that is. "Avast!" he roared at the radarman, "
inspect those tubes!"

Drake picked up a magnetron and looked at it. "Aha!"

*

Bom

Leaders in the design, development and manufacture of TR, ATR, Pre-TR tubes; shut
reference cavities; crystal protectors; silicon diodes; magnetrons; klystrons; duple
pressurizing windows; noise source tubes; high frequency triode oscillators; surge protec

© BO

...as a Case

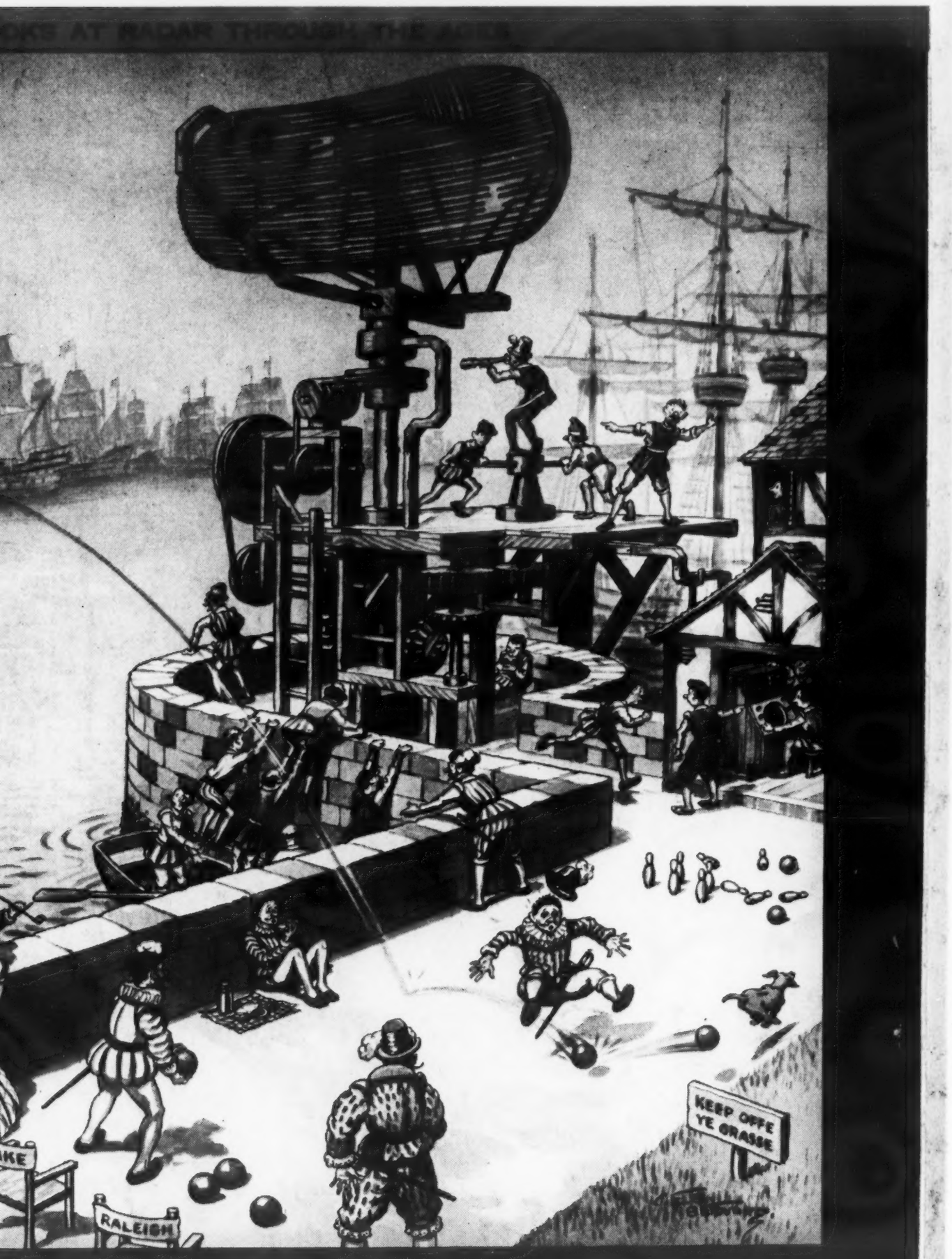
...the Spanish Armada ...t lying in the English ...r smack in the middle ...lend Walter Raleigh. ...prise. Had the IFF ...? Was the operator ...ing wrong with the ... inside the shack in a ...e radarman, "I must ...it. "Aha!" he ex-claimed. "Just as my razor-keen mind suspected!" With that, he seized the hapless operator by the throat and shook him like a tumblerful of sidecars. "I arrest you for stealing Bomac tubes and substituting these inferior substitutes, WILLIAM SHAKESPEARE!"*

"I confess, how'd you guess?" said Shakespeare, ever the poet.

"Elementary for a razor-keen mind like mine," answered Drake. "Only you could have conceived the cunning scheme of replacing Bomac tubes with factory seconds labeled "Bethmac" as a publicity stunt for your new play — Macbeth!"

"Yours is a razor-keen mind indeed!" marveled Shakespeare as they led him away. "I haven't even written Macbeth yet!"

"Plenty of time where you're going," said Drake — and went off to bowl over the Armada.



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